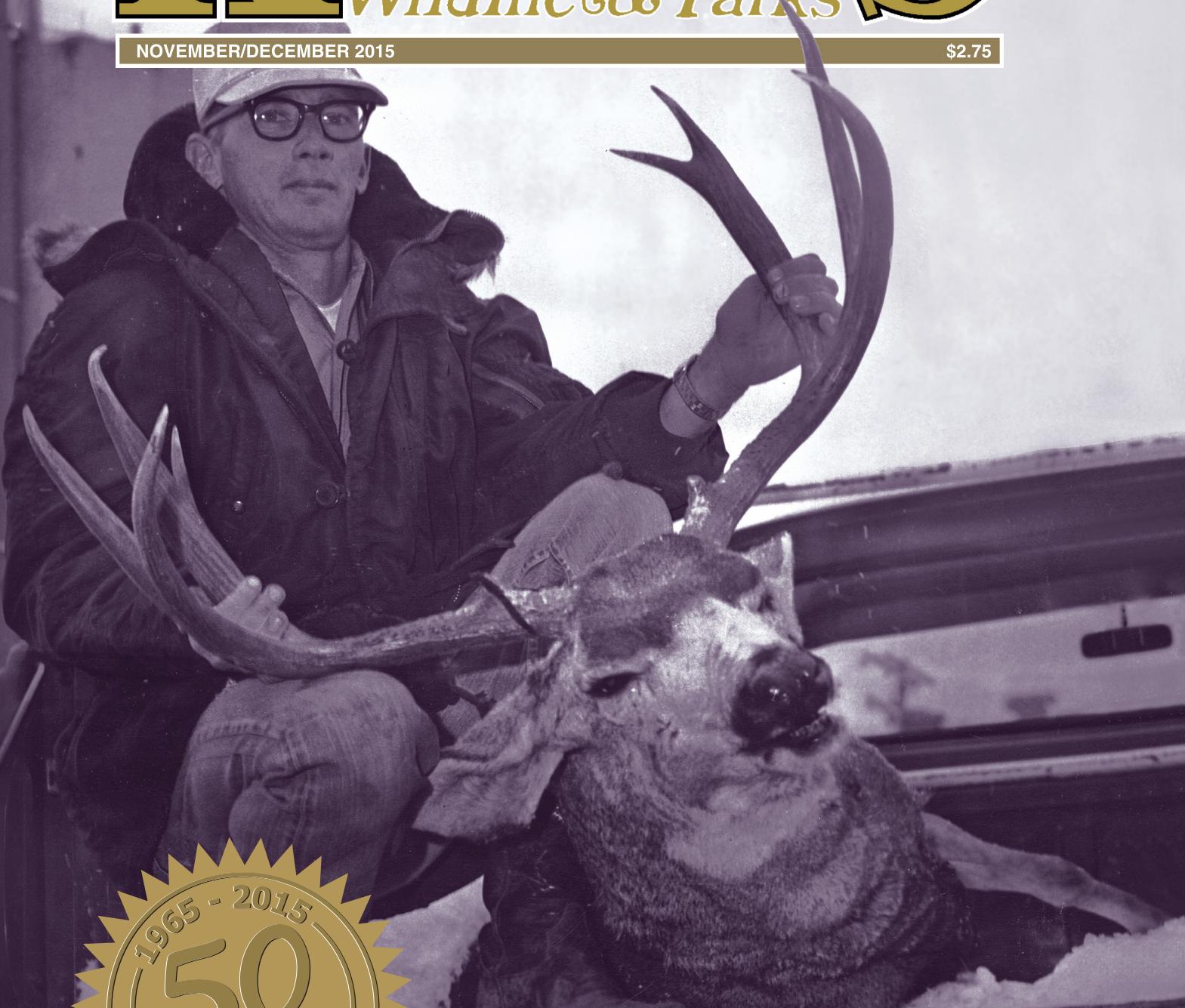


# KANSAS

*Wildlife & Parks*

NOVEMBER/DECEMBER 2015

\$2.75



SPECIAL EDITION

KANSAS 65  
FEB 2702



# KANSAS

Wildlife & Parks

NOVEMBER/DECEMBER 2015

VOL. 72, NO. 6

*Fifty years of deer. To those born after 1980, that probably doesn't mean much. But those of us who have been around for awhile have witnessed a truly remarkable comeback. In the span of 115 years, deer have gone from absent to rare sightings that headlined newspapers, to abundance, to a resource renowned nationally. To Kansas hunters, deer have gone from playing second fiddle to pheasants and quail to No. 1 in the popularity contest. To wildlife managers, deer have progressed from a limited resource carefully managed and conserved, to one that requires intense management and that drives revenues in the Wildlife Fee Fund. Whoever you are, you likely have an opinion about deer. We hope you enjoy this historical perspective of an amazingly adaptive and resilient species.*

Editors

Garden City Telegram - December 17, 1965

(Telegram Photo)

Kenny Harms, 1312 Main, got this four-point buck mule deer Monday morning about 10 miles east of Russell Springs on the Smoky Hill River. He downed it with a .243 rifle and it field-dressed 180 pounds. It had a 30-inch rack spread. His partner, Jack Morris of Piercerville, downed a three-point mule deer Sunday evening west of Russell Springs. It field-dressed 175 pounds. Kansas' first deer season for firearms ended Wednesday, lasting five days. Reports indicated it was a resounding success.

Cover photo

**Inside Front Cover:** Almost ghost-like in appearance, a white-tailed buck holds statue-still, shrouded in the early-morning mist. File photo.

Contact the Editor: mike.miller@ksoutdoors.com





## Reflecting on Fifty Years of Deer

Over the last 50 years, few things in our natural resource and hunting world have changed more than deer. In 1965, the year of our first regulated deer season, biologists estimated there were less than 30,000 deer statewide. That doesn't sound like many by today's standards, but at the time it was considered a huge comeback, since deer were extirpated from the state in the early 1900s. Deer have gone from a novelty when sightings made the local newspaper to a topic that often draws emotional and sometimes polarizing viewpoints.

On the farm I grew up on near Healy, deer were not common until the early 1970s. I remember the first one I saw. It was 1962 or 1963. As we were driving into the Family Ranch northeast of Healy on a fall Sunday afternoon, we saw four mule deer just standing there in the pasture. This type of sighting was so rare that Mom and Dad were just as excited as my brother and I. We sat there in the truck and watched them from about 50 yards away. After a few minutes they decided to leave, easily jumping over the four-wire fence, one at a time. I was 8 or 9, but I was no more amazed with their graceful leaps than were my parents.

While 50 years may seem like a long time, our deer hunting tradition in Kansas is relatively young when you compare it to other states. We were one of the last states to implement a regulated deer season, and I doubt seriously if the biologists involved in our early management plan could have envisioned the kind of hunting opportunities we have today.

In fact, Kansas ranks in the top five among trophy whitetail hunting destinations, often mentioned in the same breath with Iowa and Illinois. You can't watch any of the outdoor channels for an evening without seeing at least one deer hunting episode made in Kansas. We've gone from an estimated population of less than 30,000 deer in 1965 to an annual harvest of more than 90,000. Some of this is due to the management plan that has evolved over the years, but landowners are also responsible. Healthy deer require healthy habitat, and when landowners take good care

of the land, all living things benefit. Our landscape has changed dramatically over the past 50 years. Different land-use practices, the advent of the Conservation Reserve Program (CRP), and changes in attitudes about the land and wildlife have all made our landscape much more appealing to deer.

We often think good deer habitat, especially for whitetails, includes trees. But in western Kansas, deer have flourished in CRP and healthy rangeland. Irrigation and the crops grown as a result have played a role in the success of deer in the state, as well. The current rural Kansas landscape is much different than it was just 50 or 60 years ago.

Attitudes about deer have also changed. Some, who once thrilled at seeing a wild deer, may now be leery of driving after dark if they've hit a deer with their vehicle. Landowners who once thought of deer as vermin that damage crops may now see them as an asset to their operation. And hunters who once sat in stands for hours and hours without seeing a deer may now consider an evening hunt a bust because they "only saw eight or 10." Deer have become an important economic force not only in the funding of our Wildlife Fee Fund, but also to local communities where deer hunters spend time and money.

Where do we go from here? It's hard to predict what the next 50 years will bring and what Kansas will look like in 2065, but I know this: it will be very different. Change is the one constant in life, and our outdoor world is always changing. In a world timeline, 100 years is the blink of an eye, but in a man's timeline, it is more than a lifetime of unimaginable changes.

Agency staff are committed to managing our deer and their habitat responsibly, and we'll continue to collaborate with private landowners to find ways to enhance conservation while keeping farming operations profitable. While some may paint a gloomy picture of what the future holds for our wildlife resources, I am looking forward to seeing how our deer and deer hunting traditions continue to change. 

**KANSAS WILDLIFE & PARKS**  
November/December 2015 – Vol. 72, No. 6

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**Editorial Creed:** To promote the conservation and wise use of our natural resources, to instill an understanding of our responsibilities to the land.

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## Letters to The Editor



**THANK YOU**

KDWPT:

I wanted to thank you all for the WIHA program. This is Irving's, my 10-year-old son, first limit.

Bryan Boldridge  
Atchison

yards to attract more or varied wildlife. Perhaps this could be a regular feature in your magazine, and it might encourage others to participate in the program.

Beth Wiechman  
Sedgewick

**MONARCH MIGRATION**

Editor:

In the summer of 2014, I submitted an application along with photographs to KDWPT for our yard to be officially recognized as a "Certified Backyard Wildlife Habitat." This program, begun in 1985 and funded by the Chickadee Checkoff program, is designed in such a way that anyone can participate, as long as the essential requirements of food, shelter and water are provided. One evening in late September of this year, I was so surprised to see well over 100 monarchs "roosting" in select trees in our yard. Around 40 percent of them stayed for a second night as well. In the 42 years that I have lived in this house, we have never had monarchs roost here. This was very exciting!

I was thinking that it would be interesting to hear what others in the program were experiencing in their yards and/or what additions or alterations they are making to their



*Do you have a photo, comment, or short story you would like to share with Kansas Wildlife & Parks magazine?*

*Send your Letter to  
The Editor to:  
[mike.miller@ksoutdoors.com](mailto:mike.miller@ksoutdoors.com), or  
[nadia.marji@ksoutdoors.com](mailto:nadia.marji@ksoutdoors.com).*

# BIRD BRAIN

WITH MIKE RADER



Given the theme of this issue, I was thinking of how birds relate to hunting deer. Kind of a stretch I suppose, but then I remembered how some of my friends who bowhunt deer talk about the variety of birds they see while sitting in a stand. Several have remarked that time in a stand gives them the opportunity to look at and especially listen to the other creatures around them. Although they are mostly in tune with trying to see a deer before it sees them, they still enjoy time outside and taking in all of that nature has to offer.

Treestands provide a perfect way to get up close and personal with birds, allowing a stationary hunter to watch birds behaving naturally. While some birds will be oblivious to a hunter's presence and go about their usual routine, others can be inquisitive and know the hunter is there. I imagine birds have ruined a hunt or two over the years, but to have birds like woodpeckers, chickadees, and nuthatches at eye level can be a real treat.

If hunters are truly interested in identification of the birds they see around them, I suggest carrying a field guide to study until deer start to move. They can refer to a guide ahead of time,

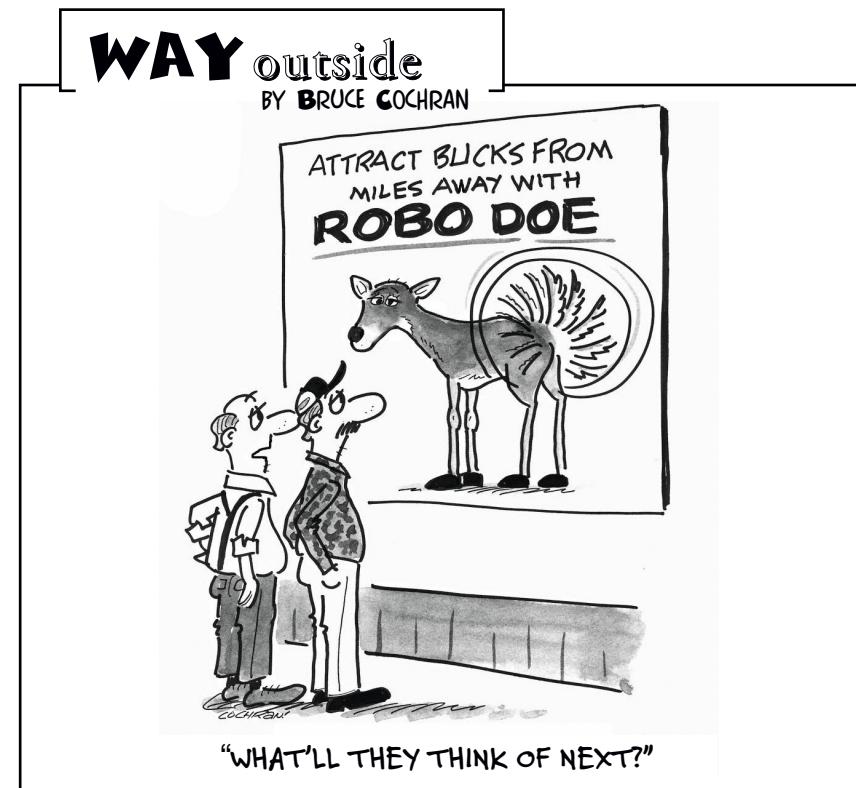
## Deer Hunting & Birdwatching: Compatible – Really?

JON BLUMM PHOTO

too, so they are prepared for birds most likely to be in the area. Hunters in the east can see a multitude of species, including sparrows; kinglets; finches, chickadees, tufted titmice, white-breasted nuthatches; downy, hairy and

red-bellied woodpeckers, and they might even be lucky enough to see a crow-sized pileated woodpecker. Western hunters have many of the same species, but usually not the diversity of the eastern forests. American robins and Eastern bluebirds are often seen by treestand hunters, especially if they are close to hackberry trees or other fruit-bearing plants.

I have heard from lots of hunters who have had up-close-and-personal experiences with many songbirds, turkeys and the occasional owl or hawk that land in their tree. One thing you want to avoid is getting found by crows – they are intelligent and really cause a ruckus when they know someone or something is out of place. I suppose that firearm deer hunters have similar experiences in a limited fashion, but there is something about the tranquility of a ground blind or treestand that provides hunters great opportunities to observe watching birds.



# AT WOODS EDGE

WITH ANDRA BRYAN STEFANOVI

## Deer: They're Part of Kansas

When they were teens, my husband and his buddy would climb up to the roof of my in-laws' house in southeast Kansas at dusk and watch for deer to make an appearance at the edge of the woods around a nearby strip pit.

The boys knew exactly where the deer were coming from and where they were going. With the help of their binoculars, they'd attempt to count the points on the bucks' antlers. These boys were duck hunters, not deer hunters, but no matter – deer are wildlife, and this was before the Internet, and it was something captivating to spend an autumn evening watching.

Early on frosty mornings, my future husband would head out with his rifle to squirrel hunt and he nearly always heard deer snorting nearby. He could imagine the steam coming from their nostrils, their heads popping up in the darkness, ears twitching, tail alert, as they sensed his presence.

About that same time, I was growing up in the next town over, the daughter and granddaughter of two deer hunters who shared the love of being outdoors. Their deer camps would stock our freezer. Grandpa had the deer processed and divided into white paper-wrapped packages for us to share.

As a Kansas teen, learning to drive meant always knowing to keep a watchful eye on both sides of the highways as autumn began to slide toward winter, especially at dusk and dawn. I'd be hard-pressed to find a friend or family member who hadn't either hit a deer, nipped one, or had a near-miss they're still shaky about when describing. (My tally is one hit, one nip, and a near-miss that left rubber on the road.)

When my husband and I married and began turkey hunting together, we'd often have our backs up to a cottonwood tree when a deer would amble by, or sometimes several. On one memorable hunt, they blocked our best shots at toms until the opportunity was lost. For 17 years, our hikes through the 50-acre woods his parents own have been peppered with stopping to analyze deer tracks to determine their line of travel, or whether one was left by a buck or a doe, and to look at scrapes and rubs.

When we built our home, Woods Edge, deer began visiting our two acres to bed down in our prairie at night, or to sip from our wetland, or to graze on grass and acorns in the meadow. They were such a common sight, in fact,

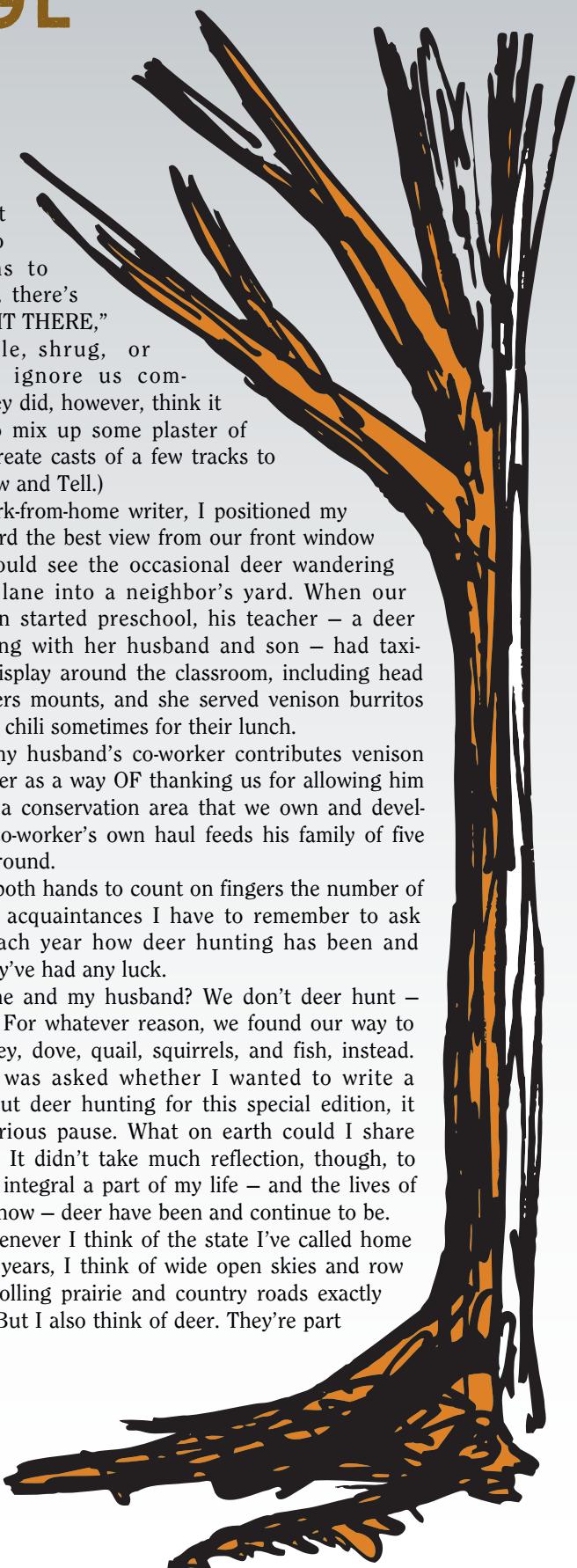
that when we'd shout to our two young sons to "look, look, there's a deer RIGHT THERE," they'd smile, shrug, or sometimes ignore us completely. (They did, however, think it was cool to mix up some plaster of Paris and create casts of a few tracks to take to Show and Tell.)

As a work-from-home writer, I positioned my desk to afford the best view from our front window so that I could see the occasional deer wandering across the lane into a neighbor's yard. When our younger son started preschool, his teacher – a deer hunter, along with her husband and son – had taxidermy on display around the classroom, including head and shoulders mounts, and she served venison burritos and venison chili sometimes for their lunch.

Today, my husband's co-worker contributes venison to our freezer as a way OF thanking us for allowing him to hunt on a conservation area that we own and developed. The co-worker's own haul feeds his family of five nearly year-round.

It takes both hands to count on fingers the number of friends and acquaintances I have to remember to ask this time each year how deer hunting has been and whether they've had any luck.

As for me and my husband? We don't deer hunt – never have. For whatever reason, we found our way to ducks, turkey, dove, quail, squirrels, and fish, instead. So when I was asked whether I wanted to write a column about deer hunting for this special edition, it gave me serious pause. What on earth could I share about deer? It didn't take much reflection, though, to realize how integral a part of my life – and the lives of so many I know – deer have been and continue to be. Because whenever I think of the state I've called home now for 45 years, I think of wide open skies and row crops and rolling prairie and country roads exactly every mile. But I also think of deer. They're part of Kansas.



For more At Woods Edge, visit [www.atwoodsedge.net](http://www.atwoodsedge.net) or [www.facebook.com/atwoodsedgelife](https://www.facebook.com/atwoodsedgelife).

## Making Trophy Memories

I have just returned from an annual hunt in Idaho, so things have been quite a flurry with me playing catch-up. When Nadia reminded me that it was time to get articles ready for the magazine, I was feeling a little pressured to come up with a new topic that I had not already commented on. But then she reminded me that this was the deer issue and she invited me to recall my favorite deer hunting experience. I must admit that at that point a large smile spread over my face as I immediately was transported back in time to a memorable incident.

Say the words "trophy hunt" and you risk being boiled in oil in today's politically-correct world. But a trophy is a very personal thing and I have found over the years that on many hunts one need not even make a kill to have a "trophy hunt." This memory is one of those "trophies" that brings joy and satisfaction to me even though others might not see it that way.

It started off before the sun came up and it was cold! There had been a little skiff of snow overnight but nothing that would slow anyone down. The idea was to hike back to a small water-hole and set up to ambush the deer with my bow as they came in to water. I got set up by finding a spot against a dirt bank with the wind in my face. I could just see out over the top of the mound in front of me and I tried to stay focused on where I thought the deer would approach from. Sure enough, as the sun started to come up behind a haze of clouds, an old doe led a group of young does down toward my hide. It still wasn't light enough to consider shooting but they came in not showing much concern for the situation. Suddenly I heard some noises to my left, just over the mound of dirt I was against. It wasn't loud but

something was definitely making noise. The wind suddenly died and the old doe's head came up, her ears flared and she was on high alert. She snorted and stomped her front feet in my direction. She waited, breathed deeply in and out, then snorted and stomped her front feet again, waiting for some movement from me. She knew something wasn't right but she didn't want to bolt yet. She repeated this exercise four or five times before she turned and slowly headed back the way she had come from with the younger ones in tow.

You might think that the hunt ended right there. But what happened next made the hunt a trophy for me. I was cold and stiff from sitting on the cold ground against a freezing dirt bank for a good part of the morning. As I tried to loosen up some I raised my head above the top of the dirt mound. Staring right in my face from about a foot away was a HUGE coyote! He was the noise I had heard on the other side of the dirt bank earlier. I looked at him and he looked at me for about two seconds and we both reacted. I jumped straight up about 3 feet and he ran off about 10 yards before turning back to look at me with that "what the heck" look, on his face. I don't know if he was breathing as hard as I was but there was quite a look of surprise still in his eyes as he seemed to shake his head to try and clear it. We looked at each other for another couple of minutes before he turned and trotted off. Every once in a while, he would turn and look back at me with what appeared to be a smile on his face as wide as the one on mine.

No shot was taken. No kill was made. But this hunt continues to be my favorite because of the trophy memories that it generates for me. Not to mention that stupid smile that I can't seem to wipe off my face!



JON BLUMB PHOTO

# Park View

WITH KATHY PRITCHETT

## It Ain't Over Yet

Traditional "summer recreation season" may be over, but that's no reason to abandon Kansas state parks. The gates are open 24/7, 365 days a year; we still have much to offer.

Many hunters already know that state park cabins offer a convenient base camp much more comfortable than the ones of deer camp lore. Comfy beds, coffee pot and microwave are nice to come "home" to after a long cold day. For bird hunters, some cabins also offer dog kennels.

Others realize that during fall, with kids in school, weekdays are quieter

than in summer. The favorite campsite is available more often. Boat ramps aren't as crowded. Trails are unencumbered by pesky mosquitoes. Without as much foliage to provide cover, wildlife can be more easily spotted. Stars are bright in the crisp fall and winter nights.

However, fall use of the state parks may still require planning ahead. Though we are working hard to upgrade all facilities to frost free, many still have to be shut down for the winter. With fewer people in the parks, we sometimes close the gate on a few campgrounds to cut down on maintenance. Campsite reservations are not available at this time of year, so camping is on a first-come, first-served basis. We encourage campers to call ahead to ensure the camp-

grounds they hope to use are open and ready. Weather can be fickle, as well, so make sure you have supplies for an unexpected turn. Remember, too, that you need to bring your own linens (sheets, pillows, towels, blankets) when renting a cabin.

Offices operate on shorter hours in fall and winter because seasonal staff don't return until spring. Many of our employees have not been able to take time off during our busy season, so occasionally, one of our offices may be closed. The park is open, but you may have to utilize the self-pay system. A call ahead a week or so before you arrive will ensure that we make arrangements to accommodate you.

Some of the best times in Kansas state parks are just around the corner. Make sure you are a part of them.



## DEER AND FISHING?

In this anniversary issue we're trying to connect all of the content to deer in one way or another. When I thought about deer and fishing, it didn't take very long for me to come up with a connection.

For more than 25 years, my wife, Lisa, and I have taken summer or early-fall vacations to Colorado. For the past 20, we've stayed at the same ranch along the Rio Grande River near Creede and in that time, I've taught myself to fly fish. When we made the trip in August and early September, one of the best flies for brown trout on the Rio is a grasshopper imitation. I bought various patterns before settling on one I thought looked like the grasshoppers common along the river and floated well for me. It was

a "Dave's Hopper," a pattern designed by well-known fly tier Dave Whitlock. I caught lots of browns on the pattern and finally decided that I should learn to tie it.

One reason Dave's Hopper floats well even in rough water is because of the deer hair head. Deer hair is coarse and hollow, and it can be "spun" on a hook and sculpted into shape. But spinning and sculpting deer hair is harder than it sounds. I tied dozens of hoppers before I finally got one to look reasonably like a Dave's Hopper. When we returned to Colorado the next year, I had four or five hopper creations that I wasn't embarrassed to show the trout, and they worked. It was satisfying.

I haven't tied one since. The next year, we started a tradition of going later in September, and while you can still catch a few trout on terrestrials then, I've found that

stripping streamers is more effective and more fun. Streamers are also easier to tie.

Deer hair is used in lots of fly patterns, including poppers used for bass. One of these days when I get really ambitious, I'll try my hand at tying a deer-hair popper.





# Outside Of My Comfort Zone: Deer Jerky Recipe

While I've tried various methods of making deer jerky, I always come back to my standby, which I learned from an old-timer 30 years ago. I've found some good recipes, but not one that inspired me to replace the standby.

I prefer simple recipes with fewer than 10 ingredients, believing that more ingredients inhibit the meat's natural flavors. My rule of thumb is the lighter the meat the less I season it. Darker meats, like deer and duck, can maintain their natural richness with a wide variety of ingredients.

So, I scoffed when I read the 16 ingredients of a jerky recipe posted on Facebook. Then I saw the name Steven Rinella, host of a program on the Sportsman Channel called "Meat Eater." I've seen him cook over an open fire at hunting camp and in a gourmet kitchen, and it all looks good.

The recipe is from Rinella's book, *The Complete Guide to Hunting, Butchering and Cooking Wild Game: Volume 1: Big Game*. Breaking out of my comfort zone, I decided to try it. As I began working through it, I wondered what would inspire someone to add zest of an orange, ground ginger and ground clove in a jerky recipe. But I held true to the recipe, and made a double batch, figuring if it was good, it wouldn't last long. I finished it on Sunday and it was gone by the time Monday Night Football came on. I made a couple of adjustments, including pureeing the ingredients and substituting chopped red onion for shallots. I let the marinade sit for 30 minutes to hydrate the dry ingredients, then added the meat, which marinated for around 15 hours.

The recipe called for using a dehydrator but I opted for the oven. I set the



- 1 cup soy sauce
- 1/4 cup orange juice
- zest of 1 orange
- 1 1/2 Tbsp. honey
- 3 cloves garlic, finely minced
- 2 shallots, finely minced
- 1 jalapeno, finely minced
- 1 Tbsp. brown sugar
- 1 Tbsp. freshly ground black pepper
- 1 Tbsp. red pepper flakes
- 1 Tbsp. ground ginger
- 1 tsp onion powder
- 1 tsp cumin
- 1 tsp cayenne
- 1/2 tsp ground cloves
- 2 lbs. lean meat from horned or antlered game (deer, elk, caribou, moose, etc.), sliced into 3/8-inch strips (freezing the meat for a couple of hours makes the slicing easier and helps to get slices of even thickness)

#### Directions

1. Combine ingredients except for the meat, in a medium bowl. Whisk to combine. Add strips of meat to marinade, being sure to cover it completely. Marinate in the refrigerator at least 12 hours and up to 48 hours; the longer it's in the marinade, the better.
2. Remove meat from marinade and drain. Pat it dry. Lay out meat on dehydrator trays, with space between the slices. Set dehydrator at 145-155 degrees and dry the jerky for 1½-2½ hours or until completely dry. (Dehydrators may vary.) Meat should have some flexibility, but pieces shouldn't crack in two when bent; rather, meat should break to reveal a network of thin white lines.

heat to the lowest setting (typically 170°) and propped the door open with an aluminum can. It takes about 3-6 hours per batch with the meat on an elevated wire rack over a cookie sheet. I turned the slices over after the first hour to keep them from sticking to the wire rack.

I've learned not to judge a batch by a sample taken right out of the oven.

Reprinted with permission from *The Complete Guide to Hunting, Butchering, and Cooking Wild Game: Volume 1: Big Game* by Steven Rinella and John Hafner, available at [www.amazon.com](http://www.amazon.com). For more information about Rinella, his television show and other books he has written, visit [www.stevenrinella.com](http://www.stevenrinella.com).

This recipe tasted okay straight from the oven, but after being refrigerated overnight in sealable gallon baggies, the flavors really popped and the texture was more consistent.

The recipe has inspired me to read Rinella's book and see what else I can learn from outside of my comfort zone.

## Memory of First Deer Lasts Forever



Deer hunters are full of anticipation each fall when deer season rolls around. The sights, smells and sounds of the outdoor world waking up in the morning or settling in for the night is magical. Add to this a close encounter with Kansas' favorite big game animal and the experience provides memories that last a lifetime. This is particularly true for youngsters or someone new to hunting when they take their first animal.

Every hunter can likely recount the scenario of their first deer like it was yesterday. Like a first kiss, first home run or first game winning touchdown, the stimuli involved in the experience don't quickly fade away. And when the reward doesn't come easily, success is all the sweeter.

My first deer with a bow was anything but easy. I started bowhunting while a senior at Kansas State University in 1986. I bought a \$125 Martin bow from Walmart and prac-

ticed with it at the soccer fields at the KSU Recreation Center. I read (real magazines since that was before the Internet) as much as I could about deer and deer hunting.

Being self-taught with no real guidance, trial-and-error was my teacher and apparently I was a slow learner. I hunted the public land at the upper end of Tuttle Creek Reservoir and saw some giant white-tailed bucks. Unfortunately, most saw me while I was shaking or fumbling around trying to get ready for a shot. Mature does seemed even warier and pegged me with ease. The ones I did shoot at, I missed. I even whiffed on one doe three different times. Forget "buck fever," I had "any deer fever" and it turned me to a puddle of goo despite being a good shot at the range.

My path to first-deer-with-a-bow success was long and winding. I was unsuccessful my next two seasons bowhunting, which were in North Carolina where I'd taken a fisheries

job with the North Carolina Wildlife Resources Commission. I was beginning to wonder if I was cut-out to be a bowhunter.

But Lady Luck shined on me at the end of the third season. It was a small (most North Carolina deer were small compared to Kansas deer), antlerless deer that meandered toward my climbing tree stand high in a pine tree. I drew my bow without being detected, released the arrow, and the deer bolted from sight.

The blood trail would be my first and it was getting dark. I tracked slowly and deliberately, not wanting to screw it up. The deer hadn't traveled all that far but the vegetation in the old-growth cutover was wooly with briars and brush.

When I laid eyes on my first deer, a button-buck, I experienced several emotions. I was mostly shocked that it finally worked out after three years trying. I was relieved. I was excited and couldn't wait to share the experience with my wife, neighbors and friends. I was proud I'd finally accomplished my goal and could now call myself a bowhunter.

Although that first-deer experience was nearly 30 years ago, I remember it vividly. I remember the distinct and unmistakable odors of field dressing my first deer. I remember the coarseness of the hair on his hide as I skinned it. And I can even smell the aroma from my first venison steak, symbolizing my position in the big game food chain.

First deer come in all sizes, some come easy, others hard-earned. The common denominator is there's only one first deer and all are trophies, creating memories that last a lifetime.





1965 - 2015

50

YEARS OF  
**DEER**

—HUNTING IN—

*Kansas*

# Celebrating 50 Years of

## Recollections of Early Big Game Leaders

Lee Queal and Bill Peabody  
wildlife biologists

It's time to celebrate something special. The first regulated deer hunting season in Kansas was initiated 50 years ago. In the early 1960s, public demand for a deer hunting season was growing. Some people thought it was needed to reduce deer-car accidents and some wanted to address crop damage caused by deer. Other people were frustrated that surrounding states had deer hunting seasons but Kansas didn't. In 1963, the Kansas Forestry, Fish and Game Commission (KFFGC) employed a wildlife biologist as Big Game Project Leader and set 1965 as the target date for the first modern deer hunting season.

When the hunting seasons was first announced, common responses were in the form of short questions; "Deer?" "Deer hunting in Kansas?" "Really?" Those doubts were understandable. Prior to settlement, Kansas had healthy populations of white-tailed and mule deer, but the record of people protecting them for the future while they used them was discouraging. On January 29, 1861 Kansas became a state. Among the initial laws in the new state was one that closed deer hunting April 1 through September 1. In 1876, the law was amended and the deer season was shortened to 4½ months. Laws are one thing, compliance and enforcement is another. A closed season did little to slow over-exploitation. Market demand was present and commercial scale killing of wildlife was a way of life. People learn slowly when it comes to natural resource management. The first wildlife enforcement officer was hired in 1905 and deer hunting was prohibited in 1908, probably decades after deer ceased to be a viable wildlife resource.

Throughout the first half of the 20th century the

recovery of the deer population was slow. While a few private individuals brought deer into the state for re-introduction, the State of Kansas never developed an active reintroduction program. Deer populations grew in Kansas as a result of natural increases in the remnant population, movement of deer from adjacent states and a few deer that escaped from public parks and private herds. By 1964, deer were present in every county and the population was estimated to be 25,000 to 30,000. Based on a significant increase in deer-car accidents, the deer population appeared to be growing by at least 20 percent per year.

As Kansas was the last state to develop a harvest management strategy, there was a lot of experience in other states to draw from. Following the lead of western states, Kansas settled quickly on a management unit approach that is still used today. Units were drawn up around major watersheds, using federal and state highways as boundaries. Since the first season, management has focused on obtaining biological information on herd characteristics and population trends for defined units. The goal was to maintain healthy habitats for the native wildlife commu-

nity. While deer were an important component in those communities, they were never managed to the detriment of other species.

With Kansas' moderate climate, it was assumed that limiting factors on future deer populations wouldn't be biological in nature. Widespread agriculture ensured food wouldn't be an issue. Winter blizzards could kill deer and drought could reduce the productivity of deer, but neither were long-term factors. Diseases, like epizootic hemorrhagic disease (EHD), were a threat, but with relatively low populations, major contagious outbreaks were unlikely. Predation by coyotes would occur, but the high productivity of deer would undoubtedly keep ahead of the losses. A predator control program just to aid the deer population was never considered.



Ross Beach, Jr., commission secretary (right), and Dave Leahy, director, inspect the first deer crossing sign ever to be erected in Kansas. This highway warning is located in Cheyenne county on US-36 and was erected in the spring of 1956.

# Deer Hunting in Kansas

It was clear that the potential size of the deer herd was going to be determined by two sociological factors: 1) How much crop damage landowners would tolerate from deer and 2) The impact of deer-car accidents. The agency was faced with developing a harvest management strategy where the growth of the population could be controlled while still providing a recreational harvest.

Additional efforts focused on the sociological factors. Attitudes of landowners toward deer were surveyed statewide before the first season and periodically since.

As plans developed for the first and future seasons, there were two key watchwords: caution and continuity. Caution was needed in developing regulations. It would have been easier to start slow and utilize a bucks-only harvest program. But other states that had gone that route later regretted it because does became "sacred cows" in the eyes of hunters. Kansas was strongly committed not to let that happen, and some antlerless permits were issued even during the first season.

Caution was also used when setting the firearm season dates. The short, five-day season was scheduled after the peak of the rut, or deer breeding season. With a scattered deer population, the concern was that a pre-rut season could leave too many does unbred, thereby reducing the potential for herd growth. Future seasons became longer, extending to nine days and eventually 12, but the timing for a post-rut firearm hunt has remained.

Continuity in the management team was considered important, as well. In the 50-plus years of deer management, there have been only four big game project leaders. After the initial hiring of Lee Queal in 1963, all project leaders were promoted from within the agency and all had been involved with how regulations were developed; Bill Peabody in 1965, Keith Sexson in 1978 and Lloyd Fox in 1995.

In January 1965, during the annual KFFGC training session at Rock Springs 4-H Camp, the commission approved agency recommendations almost verbatim. But not all employees were convinced that a season was needed or that Kansas was indeed ready for this bold new step. Agency Director, George Moore, recognized that many staff had misgivings and wrote in an agency-wide letter, "At best, deer management and deer seasons, with the associated problems, are not going to be easy; therefore, we must work together to do our best to see that this additional game animal can be utilized to the greatest advantage and to the largest

number of Kansans possible."

Agency personnel responded favorably and the first firearms season opened December 11, 1965, with 12 deer management units (DMU). Mandatory check stations were used, even though annoying and inconvenient to hunters, and they were continued for five years. There

were 4,575 permits authorized of which 3,975 were issued. This resulted in a firearms harvest of 1,153 deer at a success rate of 29 percent.

These are pretty anemic figures compared to later seasons, but the groundwork had been laid and over the years, the Kansas deer herd has grown to be one of the premier deer herds in the country. Many agency personnel contributed to the success of the first deer season and deserve credit for providing valuable insight on how the system could be improved and made more efficient.

Like all wildlife issues, the deer population and its management has had its share of ups and downs. The various presentations in this 50th Anniversary publication provide information on where we have been, where we are today, and where we are headed.

## History of Deer in Kansas

**Keith Sexson, Assistant Secretary and Lloyd Fox, Big Game Project Leader**

Children of the 1960s may recall The Rocky and Bullwinkle Show and the TV cartoon dog, Mr. Peabody with his WABAC machine and Improbable History. If only science worked that way. Unfortunately, the history of deer in Kansas is documented in a scant and piecemeal fashion with many missing links and few hard facts. For this article, we will look at three snapshots in history taken in 1804, 1904 and 2004. They will be titled: "an immense number of deer," "extreme scarcity of





deer" (possibly local extirpation), and then "overabundance of deer." We are left to wonder how deer populations can flip and flop so dramatically. The answer is people. Collectively, we make decisions and conduct activities that have huge impacts on deer.

It has been estimated that 30 million deer existed in North America when Columbus hit the shore in 1492. We could argue the precision of those estimates but if you read the detail and logic in the chapter written by Richard and Thomas McCabe in Lowell Halls' book, *The White-tailed Deer: Ecology and Management*, you will believe they were in the ballpark.

If your interest in the history of deer is just within the borders of Kansas then your first reference should be Donald Anderson's *The Status of Deer in Kansas*, published in 1964. It provides those first two snap shots. In 1804, the Lewis and Clark Expedition reported "immense numbers of deer" along the Missouri River, near the present site of Kansas City. Their observation would be supported in 1818 when a military detachment reported killing between two and three thousand deer in the vicinity of the border between Atchison and Leavenworth Counties (Cow Island).

During those early explorations and settlement years in the area, there were other snippets of observations that supported the concept that not only were there large numbers of deer in Kansas, but that the deer herd was widely distributed. In 1805, Zebulon Pike passed through the territory and reported deer in the locations of present day Chase, Coffey, Lyon, Morris and Woodson counties. From the writings of J.R. Mead (Some Natural History Notes of 1859) there would be evidence that white-tailed deer were numerous in areas like Barber and Comanche counties and what he described as the forks of the Solomon River.

Written accounts of mule deer in Kansas are less common than those of white-tailed deer. Thomas Say indicated that in 1823 the mule deer was "rather common" over the greater part of Kansas; however, many early explorers failed to distinguish which species they saw. Mead's writings (1859) may be more clear on that subject and he reported mule deer in the hills between the Saline and Solomon Rivers during the winter, but he thought they might have migrated from Colorado as he did not find them during the summer.

Deer populations had declined during the first three

centuries after Columbus, in part due to unregulated exploitation; however, the tide ebbed rapidly after the Civil War when large numbers of settlers moved west. They had accurate firearms, large hungry families and numerous days after crop harvest with no Internet or TV sports. They had time on their hands (means, motive and opportunity). If you are lucky enough to find a copy of Remington Kellogg's 1915 master's thesis from Kansas University, you can read about the decline in deer after the Civil War. He tells of two men who killed more than 100 white-tailed deer near the mouth of Lighting Creek on the Neosho River in 1867 and then goes on to describe how a different person killed one buck at that site in 1896 and that seems to be the last of the species in that part of Kansas for many years.

By the time of our second snap shot, 1904, the big game animals of the plains were for all practical purposes gone. Ernest Thomas Seton estimated that the continent-wide population of deer had dropped to 500,000 animals by 1908, while others guessed the population to be as low as 350,000. D. E. Lantz prepared a list of mammals in Kansas in 1905 and published it in the *Transactions of the Kansas Academy Science*. He suggested that the white-tailed deer was extinct in the state.

Prior to our final snapshot of deer in Kansas, 2004, we need to review a few events. In 1947, Aldo Leopold and a couple coauthors published an article in the *Journal of Wildlife Management* titled, "A Survey of Overpopulated Deer Ranges in the United States." Evidence was presented that deer populations had grown dramatically, and in some places were damaging the habitat. When it came to Kansas they noted, "There is only one deerless state: Kansas." Evidence to the contrary was developing and a statewide survey of state game protectors, county agricultural agents and work unit conservationists, as well as documentation of accidentally or illegally killed deer in 1962, led D. Anderson to conclude that there were no fewer than 12,000 deer in the state. His work and that of the game biologist of this agency eventually led to the initiation of modern day deer hunting seasons and management in Kansas.

Sportsmen, landowners, motorists and the department considered the early seasons successful. The herd kept growing, and deer hunting became more popular each year. Until 1994, Kansas deer hunting was open only to residents. When nonresidents were allowed to obtain a Kansas deer permit in 1994, they found a great deer resource. Their money influenced landowners, businesses and political life. As in the 1870s, deer meant money to people and the race was on to get a piece of it. In 1996, the maximum national speed limit of 55 mph

## " There is only one deerless state: Kansas. "

was removed. Deer-car accidents jumped up, and a new level of concern entered the minds of people. *The Science of Overabundance: Deer Ecology and Population Management* was published in 1997. Almost overnight people who had

seldom thought about deer had a new phrase to express concern. When the snapshot was taken in 2004, it was labeled, "overabundance." Under that umbrella, a host of ideas from diverse interest groups seem justifiable, and deer management in Kansas had more factors to consider.

In 50 years, deer management in Kansas evolved dramatically. In 1965, the deer season and permit framework were simple. A hunter could receive only one deer permit, and that permit determined whether the holder hunted with archery equipment or a firearm and which of the non-overlapping seasons he or she could use. A quota of firearm permits was established for each DMU, and permits were issued through an application and drawing system. There were only three types of firearm permits: the "any deer" permit allowed the hunter to take one buck or doe, white-tailed or mule deer (1,925 were authorized); the "buck only" permit allowed the hunter to take one antlered mule deer or white-tailed deer, (950 were authorized); and a "buck-only" permit that allowed the hunter to take an antlerless deer on the last day of season (1,700 were authorized). Bucks taken on a buck-only permit needed to have a forked antler (no spike bucks). There were only two options on the cost of permits. General residents paid \$10 while landowners paid \$5.

Today's permit system is far more complicated. In 2014, the department issued 211,443 deer permits. There were 46 different "privilege codes," or permit types, resulting in 11 different permit prices. Some permit types allow hunters to hunt any season with equipment legal during that season.

In 1965, the firearm deer season was five days long (Dec. 11-15) and the archery season was 46 days long (Oct. 1-Nov. 15). Only a portion of the state (12 units) was open. This year, deer seasons opened Sept. 5 and remain open for various types of equipment and seasons through Jan. 31, 2016.

In 1965, hunters killed 1,504 deer. The breakdown of their harvest was simple, 164 (10.9 percent) with archery equipment, 1,340 (89.1 percent) with firearms. Equipment such as compound bows and muzzleloaders were not authorized. In 2014, hunters killed 93,939 deer. Hunters could use a compound bow, crossbow, in-line and traditional muzzleloader, a pistol, any centerfire rifle, as well as the equipment allowed in 1965. In fact, every deer hunter in the state could purchase a white-

tailed, any-season permit, over the counter or on-line, and use it statewide during any season with equipment that was legal during that season. We now break down the harvest by hunters into eight different equipment types. Deer management with many options has another side of the coin, confusion.

Last fall there were 21 times the number of deer hunters in the field compared to 1965. Compared to 1965, hunters in 2014 bought 36.5 times more deer permits and harvested 62 times more deer. No surprise, the trend lines headed upward.

## Deer vs. Vehicles

**Lloyd Fox**

People who have a vehicle accident with a deer are often the most concerned citizens in a community about the need for deer population control. The history of vehicle accidents in Kansas has been documented carefully. In the 1950s and 1960s, an accident with a deer resulted in an investigation by an employee of the KFFGC. Often the deer was examined to determine its age and if it was a female, how many fawns it had produced. The number of accidents more than doubled between the years of 1961 and 1964 and was a factor supporting a hunting season.

A couple factors pop up when we examine the number of accidents per year over the last 55 years. Speed is a contributing factor and the number of accidents decreased following the reduction in the speed limit in 1974 and jumped dramatically after 1996 when the speed limit was raised. Starting in 1999, the department allowed hunters a substantial increase in the number of deer they could kill, and hunters took advantage the first few years. Deer-related accidents declined or stabilized in most of the 19 DMUs. However, hunters are the first to notice a decline in the deer population, and they reacted in subsequent years by buying fewer antlerless permits. They continued to purchase a permit to take a buck, but many hunters stopped buying multiple antlerless permits. Since 1999, deer hunters have harvested deer at a rate that stabilized accident rates.

## The Effects of Hunting on Populations

**Lloyd Fox**

Distribution, abundance, age/sex, and species composition of the Kansas deer herd has and continues to draw attention, especially from deer hunters. Through the years much fear has been raised that hunting pressure would harm the mule deer population, or the age structure of the population, which has an influence on the portion of the herd with large antlers. To the best of

our abilities to measure and detect those changes, the last 50 years of deer hunting in Kansas has not harmed those characteristics.

## Biology and Ecology

**Lloyd Fox**

The life histories of our two deer species starts about 50 millions of years ago. The evolution of species is generally long with many adaptations occurring through the eons, and we are left with only a faint trail in the fossil records. For brevity, I'll discuss just two traits, and I'll relate those adaptations to things you might consider when shopping for a vehicle, namely, the drive train and engine (i.e., the leg and foot structure and the gut and digestive system).

We can trace the origins of artiodactyls, or even toed ungulates, back 36-58 million years. Through the eons, the leg bones of these animals have changed so that they move in only a single plane. The adaptation of their feet allowed deer to walk and run on the tips of their second and third toes. This allowed them to develop slender legs capable in producing speed and graceful gaits. They refined those movements into speed and agility to evade their predators. The next time a deer suddenly appears and you wonder how it got there without you hearing it, remember, it walks on the tips of its toes! Mule deer have refined their movement with a unique bouncy gait where all four feet come off the ground at one time. It is called "stotting" or sometimes "pronking." Behaviorists are unsure of the purpose of stotting but believe that it may signal to a potential predator that expending its time and energy chasing this animal is not a good bet. The legs and toes of artiodactyls have evolved to provide deer with the drive train of a sure-footed, fast runner capable of evasive maneuvers.

Another adaptation is a specialized multi-chambered stomach or rumen, which also dates back 50 million years. Ruminants, or cud chewers, are specially adapted for a diet that may include relatively low quality plant material. Animals with a rumen can consume large amounts of plant material in a short time period. The animal can then find a safe place to process that food. They regurgitate the food back into their mouth and break it down with additional chewing. Their teeth are adapted for that process. A healthy ruminant has populations of microbes, bacteria, protozoa, yeasts and fungi, especially in the first two chambers of the rumen and large intestine, that break down this plant material into components the deer can use. The microflora in a rumen is a special mix adapted for the species and for their diet. While variety may be great for our simple stomachs, it could be a disaster for a ruminant. Deer and other ruminants can switch to a new diet, but the process must be gradual to allow the



## Whitetail -VS- Mule Deer

correct community of microflora to develop. The ability to use the cellulose part of plants opens a large diet base typically unavailable to animals with a simple stomach, thus an engine that could sustain them through lean times of the year and provide energy they need for growth and reproduction.

While the primitive models of artiodactyl ruminants first appeared 50 million years ago, the current models of our two species of deer come from the genus classification *Odocoileus* with an origin from 3.5 million years ago. Both white-tailed deer and mule deer first occur in the fossil record about 2 million years ago.

### White-tailed Deer (*Odocoileus virginianus*)

White-tailed deer are a highly evolved model of deer. Taxonomists currently recognize 38 subspecies based on comparative anatomy measurements and have produced maps of the subspecies distribution. More recent procedures based on DNA may refine that number. Regardless of lines on a map denoting the range of various subspecies, it is clear that this species is highly adapted for various habitats. At the southern extreme, it is found in the jungles of Central and South America to the mountains in Peru and Bolivia. In North America, we can find whitetails from coastal wetland to the desert southwest, and from urban greenbelts and suburban

backyards to wilderness areas in the mountains and boreal forest of Canada. The species has also been moved by people and introduced to locations around the world. This species is arguably the most successful wild ungulate in the world.

Larger subspecies generally exist at the northern or higher elevation areas of their distribution, a common phenomenon in wildlife species known as Bergmann's Rule. At the one extreme is adult males from the northern Midwest (subspecies *borealis*) that have been known to reach weights of more than 500 pounds and at the other end is the Key deer of Florida (subspecies *clavium*) where a healthy adult male may weigh as little as 55 pounds. Two subspecies of white-tailed deer have been recognized in Kansas, *macrourus* and *texanus*.

### Mule Deer (*Odocoileus hemionus*)

At first appearance, the mule deer species appears less successful than the whitetail. Its distribution is limited to North America, mostly west of the 100th meridian. Most authorities now consider the mule deer and the black-tailed deer to be the same species and they recognize 10 subspecies. We do not see the tremendous variation in size and other characteristics among the mule deer subspecies that we find in whitetails.

Kansas is blessed by its location on the North American continent; east meets west, and north meets

south along environmental gradients that almost imperceptibly changes as we cross the state. It is also an area where the two species of deer in North America meet or as the ecologists say, are sympatric. This situation allows us to examine factors that make them unique. White-tailed deer thrive in the east and persist even in the driest parts of western Kansas. Mule deer numbers are typically highest in the northwest part of the state and diminish eastward. People are great at drawing lines on a map, leading others to believe there might be a simple mathematical formula of factors that predict the species' limits. However, deer ignore our maps and the great ebbs and flows of species distribution and abundance follow complex rules and we are left to decipher the biological and ecological language.

## Basic Biology: The Senses

The basic biology of mule deer and white-tailed deer is very similar. Both species have keen senses of hearing, sight, smell, and taste. Both species have large ears but the mule deer wins the tape-measure award with ears measuring 7-9 inches in length or about three-fourths the length of the head. White-tailed deer ears are closer to 5½ inches and one-half the length of the head. Both species can control movement of their ears to allow one ear to cup in one direction to monitor the approach of danger while pointing the other ear in a different direction to test the safety of an escape route. The mule deer's large ears are believed to provide an additional function of heat dissipation, giving them an advantage over the whitetail in the hot, dry country. Both species can detect sound levels equal to or superior to what humans detect, but they detect higher frequencies we can't hear.

Deer are not color blind. They detect color differently than humans do, especially in the red frequency spectrum. Our eyes have a UV filter while the eyes of deer do not, so they see that UV wavelength much better than we do. Your blaze orange jacket may appear to bend with yellows in the vision of a deer but your recently washed blue jeans may jump out of the shrubbery to a deer's eyes.

Deer eyes have a high rod to cone ratio and high rod density, which enhances their ability to see in low light. They also have extremely large pupils, which let in more light. Deer eyes have something else that gives them superior night vision: behind the retina is a reflective tissue called the tapetum lucidum, which picks up more light and reflects it back on the retina. A substance in this tissue causes the bright, blue-white eye shine you see when your headlights shine on a deer at night.

Deer have a visual acuity of about 20:40 compared to our 20:20, and the focus area of deer eyes is different from human eyes. Our eyes have a sharp focus area and we adjust where we look to focus in with greater clarity. A deer's focal area is more like a band on their retina.

Their eyes do not bounce around like ours to find the best focus, but are fixed and detect a wide area rather than a tall area. Therein lays one of their disadvantages. They are tuned to sights at ground level and do not see things clearly in trees.

It is hard to sneak up on a deer. Their eyes are located on the side of their head and they detect movement within an arc of 300 degrees compared to humans with our binocular vision and a range of about 120 degrees.

Deer have an excellent sense of smell. We know that when we hear a deer many yards away downwind in thick cover blow their warning signal to let us know we have been detected. But it's hard for us to appreciate how good the deer's sense of smell is and how important is it to the deer's survival. Consider that the area of a deer's brain devoted to the sense of smell is nine times larger than the corresponding region in our brain. It has been estimated that there are nearly 300 million olfactory receptor cells in the nose of a deer compared to about 220 million in a dog and a mere 5 million in humans. What does that mean? Watch your pointing bird dog detect and follow the cone of scent to a pheasant or quail. Watch a beagle follow the trail of a rabbit. A deer's sense of smell is better.

Why devote so much resource to the sense of smell? While it may help them avoid predators, we don't believe they need it to hunt down a sprig of clover. However, deer have seven scent glands that emit chemical signals and those may aid deer in communication.

The large tarsal gland on the inside of the hind legs is used by bucks in a behavior called rub-urination. The act is believed to tell other deer about themselves. It signals the season, their gender, their reproductive status and their social rank. The metatarsal gland on the outside of the rear legs emits a pheromone in mule deer that signals alarm. Their function in white-tailed deer is unknown. The metatarsal gland is undoubtedly the best distinguishing feature that separates these two species. In white-tailed deer it is a small gland about an inch in length and surrounded by white hairs. In mule deer the gland is 4-6 inches long and covered with brown hair.

The interdigital glands between the toes emit 46 volatile compounds. Those compounds evaporate at different rates and scientists speculate that this provides a way for deer to tell how old a track is, as well as which deer made it.

The sense of taste in humans is based on clusters of taste receptor cells in taste buds on the tongue. These cells detect salty, sour, sweet, bitter and umami (salts of glutamic acid, like monosodium glutamate or MSG). A deer's taste capabilities appear to be similar to that of humans. However, the sense of taste and smell merge, and deer certainly have an advantage in that area.

Deer are known by biologists to be highly selective foragers. Yes, they have that great ruminate engine capable of breaking down even cellulose, but they are



DANNY BROWN PHOTO

fussy where they stop to fill-up. When we follow deer on a year-round basis and watch what they eat, it is clear that they discriminate not only in the species of plant they like and the part of the plant they prefer, but they may prefer one plant over another. I have seen deer focus on acorns from one oak tree and walk past piles of acorns of the same species in the same woods.

We know that deer can detect nutritional quality as well as taste. If you fertilize a woodlot or burn an area, deer will home in on those sites. Kansas University graduate student Courtney Masterson has been monitoring what deer eat and when at parks in Johnson County. Part of her research includes small fenced areas where deer are excluded. She compares how the prairie plants survive and prosper inside and outside those areas.

After two years of study on plots that excluded white-tailed deer compared to adjacent control plots where deer could browse, Masterson saw noticeable

changes. Deer appear to have an affect on the number of inflorescence and the growth of prairie forbs while retarding the encroachment of woody plants into the grassland. Her study supports the concept that maintaining a healthy, balanced deer population may be a key to preserving our prairies.

## Reproduction

Mule deer and white-tailed deer have an annual reproductive cycle. In the fall, males enter a behavior pattern called the rut and females have an estrous cycle. These are triggered by decreases in day-length and regulated by hormones. Species with an estrus cycle only mate at the peak period for conception. With deer that is limited to approximately 24 hours. If conception does not occur the female will recycle and become receptive again in about 28 days. Male deer go through a series of behaviors. In September they begin minor sparring



DANNY BROWN PHOTO

matches and rub of the bark of trees with their antlers. There is a marked increase in the diameter of their neck and males become aggressive toward other bucks, especially ones of similar physical appearance. To advertise their status, buck deer make scrapes on the ground. They paw the vegetation to expose soil in an area about the size of their body. Scrapes are often along the edge of fields or along trails. They also generally occur beneath a low-hanging branch of a tree. Typically the buck will chew the end of the overhanging branch and leave their scent by rubbing the glands of their forehead on the branch. In the scrape, bucks use the rub-urination behavior with their tarsal gland to leave scent. Often a buck will produce a series of these scrapes. As the rut continues into November, the intensity of scrape behavior decreases and bucks began to chase does. That behavior is followed by the "tending" phase, which is evident when a buck or group of bucks are seen with a doe lying nearby. Bucks will maintain their vigilance until the doe becomes receptive to mating.

The peak of conception of deer in Kansas occurs in mid-November although it may happen from September through February for a few individuals. Gestation typically in the range of 190 to 210 days.

Adult doe deer generally produce twin fawns. There is seldom much difference in the number of fawns produced each year after a doe is 1½ years old. One of the driving forces in the population dynamics of deer is the age and litter size of the first conception of a doe's life. Sexual maturity in deer is influenced by deer density and nutrition. Many of the early research studies on deer were done in forested areas of the northeast where food sources were of poor nutritional value and although the deer density was relatively low compared to what we see today, the population was often at or above carrying capacity. Under those conditions, few if any young-of-the-year female deer conceived their first fall. As deer became established in the agricultural areas of the Midwest, it was not uncommon to find that 50 percent of the young-of-the-year produced a fawn. About 75 percent of the time, young-of-the-year fawns produced a single fawn, rather than twins. Throughout the Midwest this characteristic is changing. Even though the deer population is below what most deer managers consider the biological carrying capacity, the production of fawns from young-of-the-year does has dropped. For example, in the hill country of Ohio from 1981-1983, 51 percent of the fawns conceived their first fawn but in 2010-2012, it dropped to 16 percent.

## Survival

Survival is another aspect of population dynamics in deer. In the agricultural Midwest, 95 percent of adult deer in a non-hunted area survive annually.

## How old is that deer?

Scientists and deer hunters have long desired a fast, cheap and accurate method to determine the age of a deer. Scientists want to monitor age structures within a population, and there are mathematical formulas and models that use deer ages to determine survival rates and predict population dynamics. State wildlife agencies invested heavily in collecting samples and analyzing tissues to age harvested deer. Hunters also desire the ability to estimate the age of deer, especially hunters managing for trophy-sized antlers.

In 1949, Bill Severinghaus and others in New York State published a white-tailed deer aging technique that was based on tooth wear and replacement. W.L. Robinette followed in 1957 with similar techniques for mule deer. Those techniques are still used today and are very good at determining age classes through the first three years of life. After that, the technique becomes more subjective, and accuracy declines. In the 1950s, a technique was developed to determine the age of fur seals based on microscopic examination of layers of cementum in teeth. In the mid-1960s, the technique became popular to determine age of many species of mammals, including deer. For the next two decades, that technique was the gold standard. However, many of us who have spent hours looking through a microscope, have developed a cloud of doubt about the technique. Testing against known aged animals and double sample comparisons from the same animal revealed an error rate of 17 percent to 30 percent. As the costs increased and the value of the collections declined, we ran into another problem. In Kansas we asked hunters to collect the teeth and mail them to us. Our sample size goal was approximately 400 individual deer of each age, sex and species group in each DMU each year – thousands of teeth. However, new postal sorting equipment replaced hand cancellation and many of our tooth envelopes jammed postal machinery. Switching to padded boxes or other collection methods would have increased cost. We were forced to reconsider the benefit/cost ratio of hunter-collected tooth samples.

Hunters have been busy developing techniques to estimate the age of buck deer based on changes in physical characteristics. The criteria seem promising, but the fact is that few people have the ability to use these criteria consistently and accurately. When we add in the excitement of hunting conditions, accuracy declines further. Hunters are asking themselves to do the near impossible if they plan to selectively harvest bucks of only prescribed ages.

Today we are in an instant digital world. This generation of scientists and hunters demand information and look to technology. Trail cameras promise to open new doors. One group of scientists at Mississippi State University and the Samuel Roberts Noble Foundation

are using digital photos to judge live deer and are having initial success at predicting an approximation of the Boone and Crockett score from photos. They have also been able to estimate the age of deer based on ratios of measurements of body parts. They are using 64 morphometric ratios. So far, they have been able to identify the yearling and 2½-year-old cohorts with more than 70 percent accuracy. With an army of willing hunters providing thousands of photos each year, we may someday have a whole new way of estimating the age structure of deer herds.

## Home Range Movements and Carrying Capacity

**Steven Adams and Jonathan Conard  
district wildlife biologists**

The home range of a deer is defined as the area a deer uses for normal activities of food gathering, mating and caring for young. The size and shape of a deer's home range is dependent on the quality and configuration of habitats. Deer living in diverse, high-quality habitats will have smaller home ranges than deer living in lower-quality habitats because deer living in lower-quality habitat simply have to travel farther to find what they need. A buck will generally have a larger home range than a doe, and during the rut a buck may expand its home range.

Availability of food and other factors can determine the range size. Hunting pressure has also been shown to expand or move the home range of deer at least seasonally. Deer density can also affect range size. Too many deer in an area will deplete the available food and cause the range size to increase.

Some studies have shown that even deer living in the same habitat can have very different home ranges. Some deer just seem to travel farther than others, even in good habitat. Overall, if you are wanting to keep more deer on your property and decrease the home range size, you need high quality habitat that will provide them will all of their daily requirements.

Researchers from Kansas State University and Sterling College were able to collect detailed data on movements of male and female deer at Quivira National Wildlife Refuge in central Kansas using radio-telemetry and GPS collars. In that area, the average home range for a doe was 1.7 square miles, and the average home range for a buck was slightly larger at 2.3 square miles. As the seasons transition from fall to winter, deer generally moved together to form larger social groups.

Movements of white-tailed deer may seem to be predictable at times and surprising at others. The way deer traverse the landscape to meet nutritional,

social, and habitat requirements can also change throughout the year based on the seasonal availability of resources. Further, movement patterns can also differ between bucks and does. Typically does stay primarily within a well-defined area, while bucks move more widely, particularly during breeding season.

While most movements are within a defined and consistent home range, even adult deer will occasionally exhibit long-distance movements either to explore new areas or to permanently relocate. While a relatively small proportion of adult deer disperse, these movements are important because they can allow genetic exchange to occur between populations or influence disease transmission. In the Quivira National Wildlife Refuge population, less than 5 percent of adult deer were observed to disperse. The farthest dispersal distance was by an adult female that moved more than 100 miles.

The biological carrying capacity of an area for deer is the maximum number of deer the environment can sustain indefinitely, without degrading the habitat and overall deer health. It is an ecological concept and not an easily measured condition. Biological carrying capacity is an average for the area under typical environmental conditions. Annual changes in vegetation due to weather or other temporary factors and changes in the deer population due to management practices do not change biological carrying capacity. As a population of deer approaches the biological carrying capacity, the habitat will become degraded. Heavy browsing by deer will become obvious. The habitat condition affects other wildlife species, as well. The physical condition of the deer will also decline, resulting in lower reproductive and survival rates. Optimum sustained harvest typically occurs when the population is maintained at half the biological carrying capacity.

Cultural carrying capacity is the number of deer that the people accept on the property. In agricultural areas it is generally a factor of crop damage. In a suburban neighborhood it may be set by factors like vehicle collisions with deer, damage to ornamental plantings or tick related disease. In Kansas, most areas provide deer with enough cover and food that the deer population is below the biological carrying capacity. Cultural carrying capacity has no easily observed environmental relationships.

## Deer Social System

**Lloyd Fox**

Hunters who have observed bucks fighting during the rut may believe this behavior is the key to the deer social system. People may assume intense fights determine which individual will breed and thus pass



on its characteristics to the next generation of deer. In hunted deer populations with heavily skewed sex ratios, it was assumed one dominant buck did most of the breeding; turns out that assumption was wrong. What happens with the male part of the deer equation at these intense fights has a small influence. Even the winner of the fight may not be the father of the fawns. While two large bucks are fighting, a smaller buck may breed the doe. DNA has shown that as many as 25 percent of twin fawns had a different sire. Even the land tenure system of male deer provides no important key to the next generation.

The female component in deer populations determines land tenure and the future. In the 1980s and early 1990s, Nancy Mathews and Bill Porter summarized years of studies in the Adirondack Mountains with what they called the Rose Petal Theory. Numerous researchers have documented that female white-tailed and mule deer have a high level of site fidelity, or put more simply, they lived and stayed within a small area year after year. Even if deer in an area migrated to different winter and summer locations, those home ranges stayed the same year after year. By marking fawns and knowing their dam, or mother, and then knowing where those deer established a home range, the next

level of knowledge was built. Both sexes of deer may disperse, generally in the spring when they are nearly a year old, to find new home ranges. However, only a small portion of the females disperse, while a large portion of the males move away. Female fawns tended to establish a home range within or adjacent to the home range of their mother. Successive generations established a population of closely-related female deer and the outline of their overlapping home ranges when drawn on a map have a rose-petal appearance. If you own or manage land for deer hunting, this is vital information. If you and other hunters kill most of the female deer in a small area, there will be few deer to repopulate the area. It will take many years for a new female to disperse into that area and establish a home range and begin the process of building that new rose petal. If you want more deer, you must leave sufficient does. If you want fewer deer, for example if crop damage is your major concern, then it is the females that must be removed.

This same knowledge turns out to be a key for the mule deer versus white-tailed deer issue. In the late 1990s, Richard Mackie, David Pac, Ken Hamlin and Gary Dusek summarized decades of research in Montana. They too confirmed the importance of these



matriarchal social groups. They also found a great deal of overlap in the diet and habitat tolerance of mule deer and white-tailed deer. So why did one species occur and what kept the other species from expanding into that area? In areas where these two species co-exist, it might be as simple as who got there first with the most offspring to maintain their rose-petal.

The female deer land tenure system has at least one more facet. We frequently see groups of female mule deer and fawns together and it might be easy to imagine one big happy family. Not so! While many adult females with fawns are a common sight in the fall and winter, the behavior in spring and summer is very different. An adult female mule deer will drive her female offspring away from a critical part of her home range, the place where she will give birth and raise her fawns for the first few months. These overlapping and adjacent home ranges of closely related adult female deer will include

defended territories where they raise their fawns from June to August. Therefore to be successful in expanding a population of mule deer, there must be separate high-quality fawning habitat in each home range.

## Predator Control

**Matt Peek**

*furbearer research biologist*

Bounties, cyanide guns, and strychnine-laced carcasses are mostly relegated to the history books, but some hunters' enthusiasm for eliminating the competition wherever shortages of game are perceived hasn't waned much over the years. In the deer community, the predator control debate is most prominent in the Western U.S. where mule deer populations have suffered long-term declines while cougar, bear and wolf populations have recovered from historic lows of the early to mid-1900s; and in the Southeastern U.S. where some white-tailed deer populations have gone into decline as a relative newcomer to their wooded landscape, the coyote, has become established.

On the surface, the logic seems sound; when a prey animal dies, it's often because some animal killed it for food. By reducing the "killers" (i.e. predators), one should be left with more prey animals (i.e. game) for themselves. Reality is not quite that simple.

Many factors influence how a deer population is impacted by predation. Habitat quality, herd health, weather, predator species present and their densities, and alternative prey sources either directly or indirectly play a role. In the Western and Southeastern examples cited above, scientifically-designed predator control efforts have yielded mixed but mostly ineffective results, due largely to complicating factors we don't have in Kansas.

Our situation is simple compared to most. Our deer population is healthy and below the habitat's carrying capacity, severe weather isn't a major factor in deer survival except for during occasional drought, and our only significant predators of deer, excluding people, are coyotes. They prey on fawns, but are not significant predators of healthy adult deer.

Our focus should be on habitat first. Good habitat translates into good herd health. If the deer are well-nourished and relatively disease- and parasite-free, they are more capable of avoiding predation and have higher reproductive rates to begin with (i.e. they average more fawns per doe and begin to have fawns at a younger age). A critical component of good habitat is adequate fawning cover. Old fields of native grass are ideal, as are

timber stands with good understory vegetation, often resulting from thinning trees or clearing small openings. Research has shown that in good habitat, deer production rates can remain high even amidst high predator densities, whereas production rates are usually low in poor habitat even with predator control.

Once habitat has been addressed, with or without poor documented production, predator control can be implemented in an attempt to improve fawn survival on a property. Coyotes should be the primary target. Ideally these efforts may lead to increased population growth or a greater annual surplus of harvestable does, but most buck fawns will disperse to other properties. Some hunters will find predators to be worthy adversaries and embrace hunting or trapping them as a new form of recreation.

Predator control is most effective just before, during and just after the fawning season. In Kansas, that's May and June. Coyote season is open year-round, so it is legal to hunt or trap them at that time. However, summer coyote trapping is more difficult, and furbearers that are often captured during coyote trapping may only be trapped or hunted during furharvesting season (mid-Nov. to Feb. 15).

Rather than summertime trapping, a better approach is trapping during furharvesting season, when furbearers including bobcats, a less significant fawn predator, can be taken, and pelts can be sold or tanned and kept. Though fawning season control allows less time for coyotes to repopulate, a coyote, whether killed in January or May, won't be eating any fawns in June. Concluding trapping at the end of furharvesting season relieves legal concerns associated with out-of-season furbearer capture. It is also likely a local fur trapper will do the work in exchange for trapping access during furharvesting season, if the operator doesn't wish to do it himself. If the operator wants to trap coyotes, he needs to have a furharvester education certificate and furharvester license (required to harvest furbearers or trap coyotes) if applicable. There is no pelt value for summer-caught animals, so there is no incentive for a fur trapper to trap outside furharvesting season.

After February 15, coyote control efforts can continue in the more selective form of coyote calling. Paired adult coyotes, which research has shown to be the most significant predators of fawns, become very territorial leading up to denning and reproduction, which occurs around May 1. These adults, which can be the most difficult to trap, are particularly susceptible to coyote vocalization calls, such as territorial barks or pup distress calls. Or for a little poetic justice, try the fawn distress call.

You won't get rid of coyotes. That's o.k. In a natural setting, there should be some predation, which helps ensure "survival of the fittest" – the healthiest, fastest, and most vigilant. Capturing the positive effect of predation on species, poet Robinson Jeffers wrote "What

but the wolf's tooth whittled so fine the fleet the limbs of the antelope." Predation and natural selection differentiate the wild deer we cherish from captive less-than deer that are protected by high-fence and selectively bred like livestock. A genuine hunter's interest is in wild deer, and a deer without fear of predators isn't wild.

## Deer Diseases & Parasites

**Shane Hesting**

**wildlife disease coordinator**

In a large population of deer, we should expect to find individuals suffering from various health problems. Knock-on-wood, the overall health report on the Kansas deer herd is good. But that doesn't mean we don't need to continue monitoring the deer herd. Just as we need annual check-ups, Kansas deer also need to be checked periodically. The eyes of avid sportsmen are the first line of defense for the health of the deer herd.

KDWPT has a long history of cooperation with the Southeastern Cooperative Wildlife Disease Study (SCWDS) at the University of Georgia. Samples are collected from sick and dead deer and shipped to their lab where wildlife pathologists perform tests and assist the department in understanding the implications of the case.

In 2011, the department assisted Quivira National Wildlife Refuge and the U.S. Fish and Wildlife Service (USFWS) in evaluating the health status of deer at that location. The results showed a healthy herd status.

In the following section, we will look briefly at three ailments of deer in Kansas to show a range of adaptation and unique characteristics encountered with parasites and diseases.

### Hemorrhagic Disease

Hemorrhagic disease (HD) is an illness in ruminant animals and a major disease mortality factor of deer. The two viruses that cause HD are bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV). The symptoms of the two diseases are similar and the mode of transmission is the same, which is why the term hemorrhagic disease is often used. For deer in Kansas, EHDV is most common, although bluetongue is occasionally diagnosed. However, hunters and landowners often refer to disease caused by EHDV as "bluetongue," because BTV effects livestock and is more widely known.

HD is a disease of the late summer. Both viruses are members of the genus *Orbivirus* and they multiply in the insect vector fastest during hot weather. These viruses do not spread deer to deer. Deer cannot get the disease from water or contaminated sites. The viruses need a vector for transmission, and that turns out to be biting midges of the genus *Culicoides*. These midges are also tempera-

ture sensitive. After the first hard frost in the fall it is rare to find the midges and transmission of the disease stops for another year. North of Kansas in places like Minnesota and Wisconsin the disease seldom occurs; however, climate change may end that with substantial consequences. Deer in the northern portion of the species' range have adapted without this disease. If they are exposed, the mortality rate could be extremely high.

Ruminant animals with these viruses in their body may develop a viremia, which means the virus enters the bloodstream and multiplies. When a midge feeds on that animal, it picks up the virus with the blood meal. If the midge feeds on a second animal, it may transmit the virus. If conditions are right, the second animal may become ill.

Some deer with EHDV may show no symptoms and develop antibodies and an immunity to future infections. Other deer may become ill and recover quickly while some deer may go into an acute illness phase. They are the ones we find dead, often in groups near water. Some of the symptoms we see when they are still alive are edema (swelling caused by fluid, especially in the lungs), lesions on the tongue or upper palate, and high fever. Fluid in the lungs results in difficulties breathing, and some of these deer will pant and their tongue may turn blue because they are unable to obtain enough oxygen. Finally there is an expression of EHDV where the deer becomes ill and the virus causes serious tissue damage but the deer survives for a long time. This is called the chronic state. Hunters frequently see those deer in the fall or winter after a summer outbreak. Some of the symptoms include lameness, often with abnormal growth patterns of their hooves. Many of them will be extremely thin, in part because of damage to the lining of their rumen and subsequent loss of the ability to digest food.

Sometimes the number of EHDV deaths happen quickly and can be frightening. During a severe outbreak people may find numerous sick and dead deer in one pond or along a stretch a stream. While these die-offs can be dramatic, there has been no case where HD proved to be a limiting factor on a deer population, and the impact is sporadic across the landscape. Deer in one area may be decimated while a local population a few miles away is unaffected. High numbers of mortalities due to EHDV generally occur once every 3-6 years in Kansas. Deer in southwest Kansas appear to have a natural immunity to the disease. While most deer in this area have antibodies to EHDV, showing that they have been exposed to the virus, few develop clinical illness and die. In the rest of Kansas, where the disease may kill deer, the typical survival and reproductive rates of deer allow deer populations to rebound after an EHDV event.

EHDV looks bad but all things considered, it is something that deer can survive.

## Brain worm

### (*Parelaphostrongylus tenuis*)

After eons of interaction, some parasites and hosts evolve to live with each other in a commensal relationship, with the host being relatively unaffected. White-tailed deer and brain worm (*Parelaphostrongylus tenuis*, or *P. tenuis*) have been living with each other long before the first humans set foot in North America. During this time, the brain worm evolved a dependency on white-tailed deer to propagate itself. The adult worm lives on the outer tissue lining around the brain (dura) of a white-tailed deer and feeds on the material that nurses the brain. The parasite lays eggs, which travel to the lungs in the bloodstream and then hatch into a larval stage. The larva enter the airways and travel up the trachea where the deer coughs them up and then swallows them. They are then excreted with normal waste by the deer. These deer droppings, coated with mucus, become a meal for snails and slugs. In these gastropods the parasite develops into a second and third stage, instar. At this point, some of the snails become inadvertently ingested by a new host deer where they travel to the stomach, burrow across the stomach lining and find their way to the central nervous system where they will become an adult worm and the process continues.

All is well until the wrong species of the deer family (cervidae) ingests an infected snail. Species like moose, elk and mule deer are called aberrant, or dead-end hosts. They fail to provide the correct chemical cues and the parasite travels to an incorrect part of these hosts. During that process they damage tissues, often damaging the brain of this wrong host, resulting in abnormal behavior that may kill the animal or put it at greater risk of predation or other infections, which ultimately lead to death.

It has been speculated that *P. tenuis* has the potential to significantly alter the distribution and density of mule deer and elk communities. As white-tailed deer spread and disperse into habitats occupied by elk and mule deer, the white-tailed deer may inadvertently bring *P. tenuis* to areas that were previously unaffected by the parasite. Introductions of a new parasite to naïve cervid populations may provide a competitive edge for white-tails, while reducing the densities and distribution of other cervids.

Because of brain worm's complex life cycle, there are numerous environmental factors that may influence the outcome. The number of snow free days will influence how long transmission might occur. Hot, dry periods are unfavorable for the snails and may also be a factor. It may also be argued that water developments for crops and livestock may aid the white-tailed deer and this parasite at the expense of species like mule deer.

*P. tenuis* does not affect humans and the consumption of venison from an infected deer is not a threat to those

who consume it. However, secondary infections that may arise in aberrant hosts, such as mule deer, elk, and moose, may make those affected animals unfit for human consumption. Surveillance for *P. tenuis* in Kansas has been limited, but adult worms have been found in deer from Anderson, Coffey and Mitchell Counties.

Brain worm is one of those many factors in deer ecology that sparks the minds of young naturalists and contributes to that incurable hunger for facts. So much more is waiting to be learned.

## Chronic Wasting Disease

In 1967, chronic wasting disease (CWD), was discovered among study animals inside pens at the research station in Ft. Collins, Colorado. At that time researchers didn't know how deadly the disease was to members of the deer family. Only an occasional sick animal was detected. Eventually the cause of the disease was discovered by Dr. Beth Williams. The illness is caused by disease prions and is a member of the transmissible spongiform encephalopathies (TSE) family of diseases like scrapie in sheep. CWD is the only TSE known to exist in wildlife. Over the next five decades, this insidious disease slowly spread and increased in prevalence in most locations where it was found.

TSEs were so named because of the microscopic "spongiform" appearance the disease causes in the brain of infected animals. The "holes" in the brain happen when the disease prions (infectious protein) convert healthy proteins to the deadly form. Brain cells die and in their place sponge-like holes are left. As brain cells die, the behavior of the animal changes. The TSE in cattle was officially called bovine spongiform encephalopathy or BSE, but the behavior of the sick animals was such that people called it mad cow disease. TSEs are always fatal to the animals that become infected.

Much of the early spread of CWD was due to diseased animals being moved from one location to another. Once the disease was brought to a new area, it was inevitable that additional animals would be infected. There is no such thing as a permanent deer-proof fence. Sooner or later, a tree will fall, a flood will occur or a motivated deer will find a way out. Whether the disease starts inside or outside the fence makes no

difference. However, the distance to the next hotspot is increased if the exposed animal is moved in a vehicle.

CWD does not require contact between a diseased animal and a healthy animal. Even more disturbing, deer or elk may acquire the disease simply by being where a diseased animal has been previously, and there is no way to sanitize an area once the disease has occurred. The prions that cause the disease remain deadly in soil for decades. They may also attach to plants that may then be eaten by other deer. Over decades, the disease increases in prevalence in an area.

Because CWD existed in Colorado and Nebraska in the 1990s, we knew it was coming to Kansas. In 1996, KDWPT initiated sample collection and testing. Samples from 24,891 animals have undergone lab



analysis since. The first CWD case documented in a wild Kansas deer was a white-tailed doe killed by a hunter in 2005 in Cheyenne County. Seventy-four deer have tested positive since then, and 68 percent of those came from Decatur, Rawlins, Sheridan and Norton counties.

Last year, 640 Kansas deer were tested, and 10 were confirmed positive. Samples were obtained from deer killed by hunters in southcentral and southwestern parts of Kansas and from sick and/or suspect deer observed in the eastern, northcentral and northwestern parts of the state. The 10 confirmed positives included two mule deer, one from Rawlins County and one from Scott County; and eight whitetails, including two from



Decatur County and one each from Norton, Meade, Hodgeman, Pawnee, Kearny, and Gray counties.

Although research is underway, there is currently no vaccine or other biological method of preventing CWD. The only management tool is to prevent the spread of CWD to new areas. There is no test that can determine whether a live deer or elk has this disease. Some biopsy tests can find a CWD-positive animal before they show symptoms but those tests will not find all animals that have CWD. There is no safe way to move a live deer or elk without some risk of spreading this disease.

CWD has the potential to change deer populations and deer hunting as we know it today. The disease takes months to develop in an infected animal and during that time the animal is contaminating the habitat.

Humans have not been known to contract this disease from deer or elk. However, the Center for Disease Control advises hunters to avoid eating meat from deer and elk that

look sick or test positive for CWD. Currently the likelihood of finding CWD in a wild deer harvested in Kansas is small. That small likelihood decreases even more the farther from northwestern Kansas the deer live.

Any sick deer or elk with the signs listed above or exhibiting behaviors such as stumbling, holding the head at an odd angle, walking in circles, entangled in fences or staying near farm buildings for extended periods of time should be reported to the nearest KDWPT office or the Emporia Research Office, (620) 342-0658.

Hunters can avoid introducing the disease to new areas by properly disposing of deer carcasses. If the carcass is transported, carcass waste should be disposed by double-bagging it and taking it to a landfill.

The Chronic Wasting Disease Alliance maintains an online clearinghouse of information about the disease. More information is also available at [www.ksoutdoors.com](http://www.ksoutdoors.com).

# Habitat Management

**Tyler Warner, district wildlife biologist**

To improve your land for deer, set realistic goals. Then make a plan, seek expert advice, review funding options, and gather the right tools.

Start the planning process with a map. Aerial photos will help you identify existing habitats. You may want to include water sources and topographic features, especially if you plan to manage mule deer. It is also a good idea to look at a wider area than just your property. You may find important habitat components on neighboring property, and you won't need to duplicate them as long as deer have travel corridors. You can obtain aerial photos through the following websites: Google Maps, Google Earth and Web Soil Survey.

Look for limiting factors (components missing or in short supply) that impact wildlife populations. This will help you determine which management practices should be completed first.

To improve all deer habitats to their highest potential, you'll need an appraisal of their current condition. Improving your area for deer might be as simple as making adjustments in timing of practices, a modified crop rotation or grazing plan.

Edge is where two beneficial cover-types come together. Many wildlife species, including deer, are edge specialists. If most of your land is cropped, consider establishing some shrubs, or trees such as oaks. State and federal programs, including CRP, the Environmental Quality Incentives Program (EQIP) and KDWPT's Wildlife Habitat Improvement Program (WHIP) can offset costs.

In some cases, it is more economical to include unproductive land in these programs. That 30-foot edge next to the wooded draw or on a steep hillside prone to erosion are examples. Converting some of the low-productive agriculture land into one of many CRP practices that allow trees and shrubs or native grass/wildflowers will increase the usage by deer and many other native wildlife.

No property is perfect for all wildlife. You need to consider the size requirements. Some wildlife, such as deer, have a home range of more than 1,000 acres, while others species like the bobwhite don't feel comfortable when they are more than 70 feet away from shrubs in the winter.

Deer are frequently referred to as species of early succession. Their favorite foods are forbs, and forbs prosper on recently disturbed sites. Although deer have adapted to live and thrive in a variety of habitats, certain conditions make an area more appealing. Habitat is constantly changing, and if you do nothing, the plant community will become too old for deer. Because of plant succession, habitat man-

agement should never stop.

Your local KDWPT district wildlife biologist can assist you through this process. They have knowledge and expertise on how to improve habitat on your land for deer and other wildlife. They will visit your property with you and provide you a written wildlife habitat plan. They will also assist you in choosing cost-share programs that best compliment your land and fit your objectives.

Understand from the beginning that habitat management is a long-term process. You will not accomplish your goals the first year. Some components may take decades to provide what you desire. It all starts with your plan and good advice. There are excellent guides for a white-tailed deer habitat evaluation. One that we recommend can be found at: [www.extension.missouri.edu/deer](http://www.extension.missouri.edu/deer). For mule deer, visit: [www.directives.sc.egov.usda.gov](http://www.directives.sc.egov.usda.gov)

## Food

**Andy Lyon, Public Lands manager**

Deer are herbivores with a specialized four-chambered stomach that breaks down plant material. Deer rely on a symbiotic relationship with microorganisms that live inside their digestive system to break down plant material. Although this is similar to a cow's digestive system, deer have smaller stomachs than cattle and therefore must be more selective in the plant material they eat. The nutritional requirements of deer change through the course of a year, as does the nutritional content of the food they eat. Deer possess the ability to select the most nutritional plants at any time of the year. Over 600 plant species have been identified in the diet of deer, and this diversity allows deer to inhabit all areas across Kansas.

Available forage changes across Kansas, leading to differences in forage selection. Through the year, a deer's diet consists of woody plants (35 percent), annual and perennial forbs (30 percent), agricultural crops and waste grain (30 percent), and tree mast and fruit (three percent). Grasses and other plant material comprise the remaining 2 percent of a deer's yearly diet. However, these averages vary greatly at different times of the year.

New vegetative growth in spring is high in protein. A high-protein diet is needed to improve body condition after winter and support fetus development in does. Deer preferentially browse on twigs, leaves, buds and forbs in the spring.

As plants develop, deer consume a vast array of forbs and woody plants. The succulent growth provides protein to lactating females and aids antler development in males. Food is abundant in the summer, and deer are able to select the highest protein food possible.

As the seasons progress, the amount of protein in plants begins to decrease and the amount of lignin and cellulose increases. This shift makes plants less palatable and causes the micro-organisms within the deer's digestive system to adjust and accommodate a change in plant composition. Agricultural crops and mast, both hard and soft, are high in carbohydrates, which build up fat reserves and provide energy.

In the winter, deer must select food high in carbohydrates to provide energy and fat, including hard and soft mast and agricultural crops. Twigs, leaves and forbs are also consumed if still available.

A food plot can provide an additional food source and manipulate habitat, which is beneficial for many non-target species. Food plots are utilized if they are still present during harsh winter conditions. A good food plot may consist of sorghum, wheat, clover and brassica or any mixture thereof. Food plots won't increase an area's deer carrying capacity or improve antler size and development.

Supplemental feeding (feeders) is popular because it can congregate deer for increased harvest potential. However, supplemental feeding can cause deer stress by introducing a food source that the deer's digestive system hasn't had time to adjust to. And supplemental feeding also has the potential to increase the spread of disease by congregating deer. While legal, supplemental feeding is controversial.

## Cover

**Steven Adams**

**district wildlife biologist**

Cover provides deer with safety from predation and protection from the elements. Cover requirements vary throughout the state but as a general rule no more than 30 percent of an area needs to be in good cover to have a healthy deer herd. White-tailed deer are very adaptable and can live in areas made up of much more or less than the 30 percent cover. Good cover is most often associated with native deciduous trees or shrubs; however, areas with rolling hills, canyons or ravines will require less cover than flat areas. Food and cover areas often overlap and for a good portion of the year, croplands not only provide abundant food but also cover. CRP fields and wetland areas also provide protective cover for deer.

While Eastern redcedar is a species that can meet cover requirements, it should be avoided. It is common in conservation plantings such as windbreaks and shelterbelts but has spread throughout Kansas. Much of the spread of cedars is due to fire suppression and poor management. While woody plants are an essential food source for deer in the fall and winter, cedars have virtually no forage or mast value for deer and can quickly

create closed stands and suppress desirable plant species. Prescribed fire is a critical tool for deer management. A fire can set back succession and promote desirable native plant species. Cedars are not compatible with a prescribed fire management plan.

Mature stands of hardwood trees can be improved with a timber management plan that includes culling some trees. Opening the canopy will allow understory vegetation such as shrubs, forbs and grass to become established increasing the amount of forage and browse available to deer.

When developing woody cover, native fruit or mast producing species are desired and try to create as much edge habitat as possible. The interspersion of habitat types will create the best deer habitat.

## Water

**Steven Adams**

Water is the final habitat element. Typically deer fill their need for water from either free standing sources or metabolic sources from their food. Although water is not as important as food and cover, it can be a limiting factor.

Deer will readily use many water sources, including lakes, ponds, streams, livestock tanks, springs, wetlands, snow and temporary depressions filled by rain. During spring and times with adequate rains, deer can get most of their water requirement from succulent plants. During the hot summer or during drought conditions, plants contain less water and deer will search out free water. Does nursing fawns have an increased need for water.

Research shows that deer can go for extended periods without free water. However, having at least one permanent water source per square mile would be adequate to fulfill the water requirements and help keep deer on your property. Having additional water sources can distribute deer across a larger area, lessening the impacts on vegetation at watering areas. Research has shown that a water source is typically at the center of a deer's home range.

## Woodland Management

**Tyler Warner**

Too often, a person new to managing deer habitat focuses on the hunting season. However, good deer habitat must provide what they need throughout the year. Ideal woodlands for deer should be protected from grazing, have mast producing trees like oak and hickory, and contain multiple species with openings for sunlight to reach the understory. Woody browse and forbs provide critical nutrition (protein / amino acids). Forbs are critical during the

growing season and woody browse is critical during the winter and early spring. Grains (mature seed), such as sorghum and corn, are a source of carbohydrates in late fall and winter.

Timber harvest and prescribed fire to open the woodland canopy are methods of timber stand improvements (TSI). This will stimulate woody browse and herbaceous vegetation where deer may reach it and increase available forage. TSI may also focus on retaining high-quality mast producing trees, such as oak, hickory and persimmon, while removing less desirable trees. TSI can also improve the quality and growth rates of timber for harvest and income. Supplementary plantings might be an option in degraded woodlands. However, if the local deer population is high, you may need to use intensive and costly practices to grow trees past hungry mouths. Planned during the dormant season, woodland burns are safe, and often require minimal equipment. However, extra care needs to be taken to evaluate fuel levels, dryness and weather conditions, so the fire doesn't damage desired trees. It is best to get advice from a local forester before implementing TSIs.

## Cropland Management

### Tyler Warner

Minor changes in crop production can greatly improve the landscape for wildlife. Some cropping practices and planting designs will save the producer money (for example, eliminating inefficient turn rows), improve soil fertility, improve water quality, and are also beneficial to deer and other wildlife. Crop rotations can add diversity to the landscape. The benefits of cover crops can not be over emphasized. Many cover crop options are nothing short of spectacular food plots for deer. At the same time, cover crops prevent soil erosion, increase soil fertility, add organic mulch, and are beneficial in weed, pest and disease management. No-till options may be beneficial, and mowing field edges, roadsides and waterways every three years can save money and benefit wildlife.

Broadleaf crops such as alfalfa, clover and soybeans attract deer and provide a source of protein during the critical time each year when does are nursing fawns. Winter wheat provides excellent forage for deer during the winter and early spring. Feeding deer may damage certain crops, impacting a manager's tolerance for deer. However, deer use of

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winter wheat seldom results in measurable reduction in wheat yields. Leaving a few rows of unharvested crop close to shelterbelts, streams and riparian woods is a great way of providing that high energy food that deer require during the winter.

CRP grasslands are beneficial to both landowners and wildlife. Deer numbers increased quickly after CRP changed the landscape of western Kansas, providing vast undisturbed fawning sites. CRP in the fall and winter provides excellent escape cover where formerly bare soil or short, heavily-grazed pasture had provided little. Many beneficial wildlife practices may be incorporated into a landowner's CRP plan, including prescribe burning, discing and food plots. And while CRP benefits deer and other wildlife, it also fits into the economic needs of the landowner and removes highly erodible sites from annual farming. These are just a handful of examples, but any sort of added plant diversity and cover to your croplands will benefit deer.

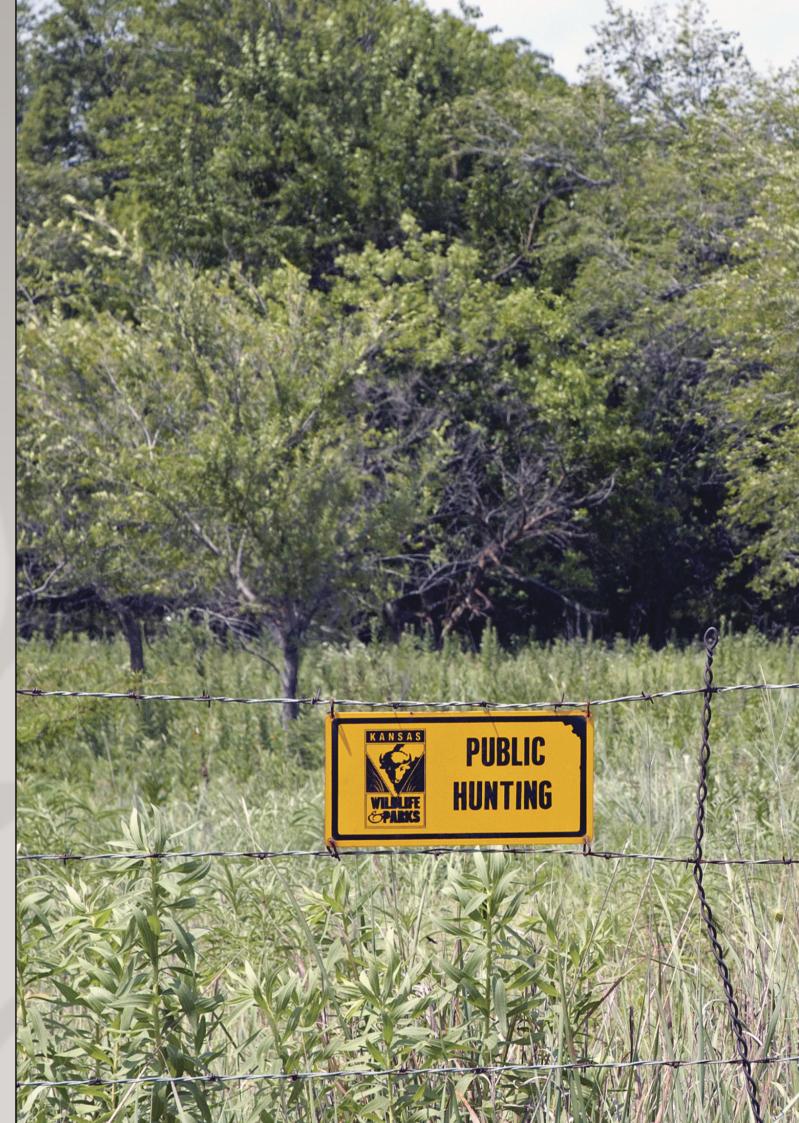
## Grassland Management

**Alex Lyon**  
**Public Lands manager**

Deer consume very little grass, but they depend on grasslands throughout their life. Deer in Kansas prefer to bed in grasslands because they provide concealment and fast escape. Does give birth and hide fawns in tall grasses to protect them from predators. Grasslands also provide a diversity of broadleaf vegetation, which is consumed year-round.

Proper grassland management allows for diverse vegetation and provides grazing opportunity for livestock. Overgrazing grasslands diminishes the quality of habitat and also reduces grazing potential. Under-grazing, or the lack of disturbance to grasslands, encourages succession, allowing shrubs, trees and eventually closed-canopy forest to take over. Natural Resource Conservation Service (NRCS) range management specialists and KDWPT biologists can help landowners determine proper stocking rates. Following proper stocking rates and adjusting for environmental conditions improves livestock production and enhances deer habitat.

Additional management is required to maintain grassland diversity and productivity for livestock and wildlife. Fire is the single best management tool used to maintain and restore grasslands in Kansas. Prescribed fire removes fire intolerant plant species, such as Eastern redcedar and locust, while promoting the growth of fire tolerant plant species, such as native grasses and oak species. Fire also stimulates many forbs and woody browse that deer consume throughout the year. Prescribed fire, when used cor-



rectly, is a cheap and easy way to manage grasslands that are beneficial for livestock production and wildlife habitat.

Kansas is blessed with a variety of grasslands from the tallgrass prairie in the east, to the mixed-grass prairie in central and the short-grass prairie of the west. These grasslands provide grazing potential and support a wide variety of wildlife species. Regardless of the type of grassland, routine maintenance is required to keep the grasslands productive and remove woody vegetation.

## Cooperating with Neighbors

**Justin Harbit**  
**district wildlife biologist**

Private land deer management has always been a difficult topic simply because the average landowner in Kansas does not own or manage enough land to cover the daily movements of a family group of deer, let alone the yearly requirements of an entire herd. No amount of habitat or food will keep a deer confined to 160 acres, especially during intense movement periods like the rut. This means that the



## Habitat Management on Public Lands

Kent Hensley, Public Lands manger and Rob Riggan, Public Lands manager

Habitat management for deer on Kansas' public lands is dynamic. Topographical features, weather and soils vary greatly from the High Plains physiographic region in the west to the Ozarkian and Glaciated physiographic regions of the east. Average annual rainfall in these regions varies from less than 16 inches to over 40 inches. Accordingly, dominant vegetative types and vigor differ greatly.

Wildlife area managers attempt to determine which practices are best for the specific habitats on their area. Wherever possible, parts of an area will be managed to benefit deer. Once the area is evaluated, it is managed at scales that will provide the best outcome. If fawning cover is limited, they may expand grassland areas, especially around fields and adjacent to woodlands. If escape cover is limited, they may focus on dense screening cover or manage for increased brushy areas. Food is frequently a concern. Production of food for wildlife is often worked into agricultural contracts. A visit to a wildlife area during winter will generally show more potential food for wildlife than is typical even in an agricultural state like Kansas. One of the guiding principles is healthy habitats produce healthy wildlife.

No public wildlife area in the state of Kansas is managed exclusively for deer. However, deer habitat is given high priority. On areas managed with an eye toward popular game species, such as turkey, quail, cottontails and pheasant, deer habitat practices are frequently a strong secondary priority. However, deer prosper in areas managed for wildlife in general.

Specific examples of deer habitat improvements on public areas include special attention to manipulate plant succession. Certain trees are removed or portions of a forested area may be cut to create openings. In the west, crop fields planted to cover crops or left idle for short durations provide cover and food sources important to deer and other wildlife. Small and large food plots placed near diverse cover types provide easily recognized food sources.

Tools used by wildlife area managers to manipulate vegetative types include mowers, herbicide, tillage equipment, fire, timely grazing and tree removal equipment. They even consider practices like restricting vehicle access, or on the other side of the issue, they may develop access for people with

individual landowner or land manger usually has limited influence over the direction of the local deer herd as a whole. Because of this, deer co-ops have become popular. They pool acreage and resources from many different landowners and help remove obstacles an individual manager faces.

Co-ops are a group of like-minded landowners, hunters, and land managers who share similar interests in deer management. By managing the group's resources as a whole, the co-op can have a larger influence on the management of the deer herd than any member would have working independently. Typically co-ops develop a deer management plan with goals the group agrees on. The primary goal is often the size of antlers hunters may find on bucks in the area and the term "quality" is often used to identify this desire. Antler size should not be the only objective of a co-op. Co-ops can focus on anything that is of a common interest to the group, including hunting ethics, improving relationships with landowners and adjacent hunters, and minimizing damage. Co-ops developed primarily for shared desires about deer management may expand to include management of quail, turkey, waterfowl, and other wildlife.

special needs. Because the vegetation changes over time, the work of wildlife area managers is never done. Without successional management over the years, many of Kansas' public lands would become closed canopy forest, dominated by pole stands of elm, cottonwood and other species with a relative low value for wildlife. Those sites would lack the ground cover and diversity that deer desire, as well as lack the mast production and structure that both deer and other wildlife desire.

## Managing Deer

Lloyd Fox

Authority to manage deer in the United States comes from the people through their elected officials. State laws are created and in most states, a public agency is designated and empowered to design programs. That agency is given law enforcement powers and authority to hire employees, collect data, consult experts, and hold public meetings. The desired outcome is to create a season framework, permitting system and regulations that will give the best results for the most people.

Deer managers typically think of deer management from various perspectives. At the top of their list is generally the ecological perspective. Are deer populations at levels the habitat can sustain? Is the mix of mule deer and white-tailed deer correct for the ecosystem and long-term sustainability? Other considerations include health issues and impact of deer on other wildlife. Will climate change impact the distribution of disease? What's next on our horizon?

Another important perspective includes social issues. Is the hunting program fair and equal for everybody? Do the rules and regulations encourage hunter retention and recruitment or alienate potential supporters? Is the deer population being managed so as to increase the tolerance people feel toward deer? Then there are economic considerations. Is society benefiting from this management?

Deer management needs objectives and goals. For years deer managers used harvest numbers as their metric to determine if they were doing a good job. Things are more subjective today. Today we ask, "Is the program in the proper balance of opportunity versus quality?" For some people, quality is simply the euphemism for big antlers but for others, quality is an undefinable characteristic of their life. They know it when they have it and it may have nothing to do with the size of deer antlers.

Deer managers have an eye toward the future. There is an innate fear. Will they have the key piece of scientific research to answer future questions? Have they formulated an adaptive strategy they can test to determine which way to turn?

The Kansas deer management program got off to a great start 50 years ago. We managed to avoid many of

the pit-falls such as buck-only deer hunting. There are aspects of deer management that once undertaken, appear unstoppable or unchangeable. We avoided some of them, as well. The post rut firearms deer season is an example of that fork in the road. However, we missed the feeding and baiting fork in the road and also the one dealing with domestication of wildlife.

Kansas is blessed with fertile soils capable of producing excellent habitat for deer. Kansas deer managers thought that because of social tolerance limits on deer, we would not experience the habitat limitations on deer that states to our north and east had experienced. There were no browse lines at the edge of woodlots in the 1960s and 1970s. Today there are few woodlots in Kansas that an ecologist will not notice the changes that deer have caused to habitat. Habitats in Kansas have limitations for deer.

Deer hunting developed slowly and steadily. When we look at number of hunters, permits sold, and deer harvested, all trends increased during the last 50 years.

The culture around deer hunting developed differently in the agricultural Midwest than in forested northeast or Great Lakes states. Until the influx of nonresident deer hunters, it was extremely unusual to find what you might call a deer hunting camp in Kansas. The Kansas deer hunting tradition evolved as a solitary endeavor, rather than a group activity. Limited permits had an influence on that. One of the techniques the agency used to foster more camaraderie was a permit option called



the buddy system, which allowed a group to apply in a single application. Either everyone drew a permit or nobody drew a permit. The first three decades of deer hunting during the firearms season could be characterized as driving to your spot, shooting the deer and getting home in time to watch the football game. Kansas deer hunters experienced some of the highest harvest success rates in the nation, as well as being treated to some of the most impressive bucks found on the continent. However, the deer hunting culture, forged through shared hardships, disappointments and common goals, which provides social and political strength to deer management programs elsewhere, didn't develop here. Things were so easy that everybody thought they could do it and many were convinced they could do it better than the state wildlife agency.

There appears to be an endless variety of factors in formulating deer management. No state wildlife agency can be successful in managing deer without support from the public and the legislators they elect. When farmers experience crop damage caused by deer, homeowners lose prized ornamentals or motorists have accidents with deer crossing the highways, those important keys need to be addressed.

However, quietly in the background are the two main keys in deer management that are outside the political realm, namely the deer social and reproductive characteristics that determine how many deer will be produced and where, and hunter motivation. No matter

how many permits are available or how long the season is, hunters may choose to maintain deer numbers at levels different from the desires of the whole society.

No aspect of deer management perplexes a deer manager more than hunter motivation. With deer we can place a transmitter collar around their neck, draw blood or sample their DNA. We can obtain answers from them. Most deer hunters will not tolerate those techniques and buck and bite when we send them opinion surveys.

## Role of Law Enforcement

**Kevin Jones, Law Enforcement director**

Law enforcement has played a major role in the success of the deer management plan in Kansas. The statutes and regulations have served the state well in establishing the management frameworks that brought deer to a nationally recognized resource. The ironic thing about these laws is that they really have no control over the deer resource itself, but rather affect people in how they relate to and use the deer resource.

Early on in the conservation of North America's wildlife, it was recognized that the impacts people have on wildlife populations can be enormous. Laws were enacted to regulate the take of wildlife and to eliminate the commercial use of wildlife resources. In Kansas, laws were created that initially prohibited hunting deer, and then later allowed a very limited, controlled hunting season.

The success of a management plan relies on people. Legal, ethical hunting is the cornerstone to a deer management program and is the primary method of keeping deer numbers at acceptable levels. Our laws designate a certain number of days to hunt, limit the number of deer that may be taken by a hunter; specify license and permit requirements, as well as equipment hunters can use.

While following the rules may seem simple, there are people who do not. Commonly called poachers, these people believe the laws don't apply to them, or maybe they simply don't care. Whatever their rationale, poachers can wreak havoc on deer numbers and management plans, particularly in localized areas. It is the job of law enforcement to safeguard the resource and ensure the rules and regulations are followed.

Poaching is a serious issue. In today's world, poachers are not killing deer to feed their families. Most deer are poached for their antlers. In one case, two individuals killed more than 60 mature bucks over a two-year period. The only explanation was they wanted the antlers. In another case, a group of nonresident hunters illegally killed more than 110 mature bucks over a three-year period. Again, the primary reason was the antlers and bragging rights.

While law enforcement plays a significant role in the success of the management program, it is important to





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note that there are simply not enough game wardens to ensure compliance. Wildlife management relies on hunters complying with the laws, but we also rely on the public to provide information about poaching. The public's participation in reporting poaching is a force multiplier that directly increases the law enforcement efficiency and success in bringing criminals to justice. Some of the Department's most significant prosecutions were the result of a tip being given to a game warden.

The state's deer resource belongs to the people in the State of Kansas. It is a very important part of the state's conservation story. It deserves to be conserved, managed and protected for the greatest benefit to the citizens of Kansas.

## People's Desires

*Lloyd Fox*

A successful deer management program is supported by the people. To ensure that an agency is on the correct course, public input is sought. Put a dozen people in a room and ask what their desires are for a deer population and you'll probably get 13 – 14 different answers. At least a couple of them will change their mind during the process. People desire so much from their association with this species, and it is often difficult for managers to determine which they should go.

## Motorist's Desires

This group is easy to understand and appreciate. They want safer roads. We know much about the when and where and even the contributing factors to deer-related vehicle accidents (DRVAs), but we have few methods of changing the behavior of either deer or people. There is a strong seasonal and daily aspect to DRVAs. They peak during the deer mating season in November and those accidents are always substantially higher at night than during the day. Vehicle speed influences both the number of accidents and their severity. In the 1970s during the oil embargo period, our nation enacted a nationwide speed limit of 55 mph. DRVAs dropped almost in half compared to what it had been before the lower speed limits. In the mid-1990s, those limits were removed. In some places we can drive at 75 mph day or night. You guessed it, DRVAs almost doubled when that occurred.

## Landowner's Desires

From the days before the first deer season in Kansas until the present, KDWPT has recognized the importance of landowner opinions in deer management. In 1963 we initiated our first opinion survey of landowners about deer. That survey has been repeated on a regular

basis and is a standard part of the data we gather to help with decisions.

As with hunters, this group has many different desires, and the emphasis changes through the years, so we need to gather new information on a regular basis. In the 1960s and 1970s, landowner concerns were mostly about deer hunting opportunities. Landowners wanted to hunt deer each year even when general residents were not getting that opportunity. They argued for the Hunt-On-Your-Own-Land deer permit that they could always fall back upon if they failed to draw a permit. As the deer herd grew, a time was reached when all residents were getting a deer permit if they wanted one. In the 1980s, the issue became crop damage and landowners wanted permits that allowed them to kill deer outside the hunting seasons if deer were causing crop damage. In the 1990s, the issue at the top of their list was deer permits they could sell. It was clear that the deer resource had an economic value to landowners. Almost overnight, Kansas went from the last state in the nation to allow nonresident deer hunters to the state with the highest ratio of nonresident deer hunters to resident deer hunters.

## Hunters' Desires

At first glance, we might think that hunters simply want more deer, but that is just part of their wish list. Some look forward to adding venison to their freezer. Others want to pursue them during a specific time of year or using a specific type of equipment. Some want more access to places to hunt while others want few competing hunters for the places and deer they hunt. Some are happy when they see more deer than they saw last year. Some want a cheaper permit. Some want bucks with bigger antlers. I'm sure I've left somebody out and omitted their desires. If they read this, I'll bet they write or call to let us know!

One of the techniques we have used when we surveyed hunters is the trade-off approach. We ask them what they be willing to give up in order to get the aspect of deer hunting that they most desire. When we do that, the answer is clear. More than anything else, hunters want the opportunity to hunt each year. Yes, they want these other aspects, but if they had to give up hunting one or more years, they change their mind. Some of them may be in favor of somebody else losing that opportunity, but they are not anxious to lose it themselves.

## Hunting Equipment

*Charlie Swank, district wildlife biologist*

In fifty years, not only has our deer herd evolved, but so has the equipment hunters use to pursue them. Prior to 1965, Kansas was a shotgun state. Hunters spent most



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of their time hunting pheasant, quail, waterfowl, and other small game. With the opening of the first deer season, hunters needed a high-powered rifle or bow, plus some new equipment.

Regulations in 1965 permitted centerfire rifles that fired a soft-point, hollow-point, or other expanding bullet larger than .23 caliber. Besides the limit of caliber, the cartridge had to be at least two inches long or a .44 magnum. Most rifles of the day were lever or bolt action, made of blued steel and had a walnut stock, and were usually chambered in .30-30, .30-06, .270 or .243 cartridges. Shotguns, which fired slugs, were also legal in 10, 12, 16, and 20 gauges. Sights were often factory iron, and if scopes were used, the fixed four-power was the most common. Bird hunters used their shotguns with bead sights with slugs to hunt deer.

Reviewing the 2015 deer hunting regulations, it becomes apparent that things have changed. Any centerfire rifle or handgun as well as any gauge shotgun are now legal. Although bolt actions are still the most used rifle, semi-automatics using the AR-15 platform are becoming more popular. The cartridges used in 1965 are

still popular, but the .223, .22-250, and numerous newer magnums are all the rage. Furthermore, the glossy wood has been replaced with synthetics, including fiberglass, plastic, carbon fiber and Kevlar, and stainless steel has become the metal of choice. Factory iron sights are almost never used, and fixed power scopes have been replaced with variable-power scopes with large light-gathering objective lenses. Not mentioned in the 1965 deer hunting regulations, muzzleloaders are also legal, but they must fire a bullet of at least .40 caliber. They have transitioned from traditional-looking muzzleloaders with open sights and caplock ignition to inline scoped rifles capable of taking deer out to 200 yards and beyond. Previously, figuring the distance of your shot was a guess at best, but now laser rangefinders make range estimation easy and accurate.

Archery equipment has changed even more. Legal archery equipment for the first deer season included longbows with not less than 35 pounds pull, and arrows had to be equipped with steel broadheads. Crossbows or any other mechanical bows were illegal for deer hunting. Today, longbows, crossbows, recurve bows, and compound bows are all used for taking deer. All arrows used for hunting big game must be equipped with broadheads that, when fully extended, cannot pass through a ring  $\frac{3}{4}$ -inch in diameter. As the popularity of deer hunting grew and the quest for "trophy bucks" intensified, so did the search for better accessory equipment.

In the early deer seasons, archers had only two camouflage patterns to choose from, the green or brown camo used in World War II. These worked fine, but hunters wanted more, and the sporting goods industry was more than willing to help them. Now there are color schemes to match almost any vegetation type in any part of the world during any season.

Additionally, blinds and stands have come a long way. Gone are the days of nailing scrap lumber in the fork of a tree. There are factory-made tree stands of all kinds, including tower stands and pop up blinds that can be used almost anywhere.

Waterfowl hunters have always used decoys, but now there are decoys for deer hunting. There are decoys that are available in full body, silhouette, buck, or doe varieties and in many different poses. Moreover, they are lightweight, portable, and easy to setup.

The use of scent chemicals has also made technological advances. Mimicking the smell of food or a doe in heat, lures and scents are also used to attract deer to a chosen site. Examples include using a scrape, mock scrape, or dripper. There are also sprays and clothes that claim to cover up or eliminate unwanted odors.

In the last 20 years, deer feeders have become very popular. The offering of high-energy food in almost unlimited quantities can be a strong attractant for deer. These feeders are used in many cases to attract deer where no natural food or crops grow.

The one piece of equipment that has brought deer hunting into the electronic age is the trail camera. Now hunters can watch their favorite deer trails or food plots 24 hours a day on a laptop computer. This allows them to not only watch deer, but to find that special buck they have been looking for.

What does all of this equipment that has been invented and marketed to hunters over the last five decades mean? There are those who think all of the new gadgets are a necessity and that they help the hunter be more successful. In contrast, there are those who believe that all of the newfangled inventions lessen the quality of the hunt and decrease the use of woodsmanship. The answer probably lies somewhere in the middle. It is up to each hunter to decide which equipment to use, but fair chase and the quality of the hunt should be more important to the ethical hunter than what is bagged.

## A Place to Hunt: Public Lands and WIHA

Kent Hensley and Rob Riggan

As the number of deer hunters in Kansas increased from 1965 to 2014, finding a place to hunt became more difficult. Kansas land is 97 percent privately owned, so there is relatively little public land. As the number of deer hunters has increased, the pressure has been felt at public hunting areas.

KDWPT manages almost 300,000 acres of public land for hunting across Kansas, including more than 100 wildlife areas that are state-owned, or licensed to KDWPT by the federal government. There are eight federal areas encompassing nearly 150,000 acres managed by the USFWS, U.S. Army Corps of Engineers or National Forest Service. Each public area is unique in relation to its deer habitat type, deer density and deer hunting opportunities.

The Walk-In Hunting Access (WIHA) program began in 1995 and has vastly increased hunter opportunities by leasing private land and opening it to hunting. This year approximately 1,050,000 acres have been opened to hunters through WIHA. Generally the land is selected for upland game bird hunting, but many of the areas also have deer hunting opportunities.

All state and federal wildlife areas provide access without entrance fees and most areas have open access, allowing hunters to hunt as they please. Some wildlife areas, or portions of them, may limit access through special draw hunts, youth hunting only, equipment restrictions. These various deer and hunter management techniques allow hunters to choose the hunt type and area that best fits their hunting style, as well as desired experience. Population and hunter management strategies are implemented in an effort to provide the highest quality of public land deer hunting attainable. Walk-in access is the norm, but several areas allow disabled

hunters to utilize motorized vehicles for hunting.

Many areas have refuges where all access is prohibited during certain times of the year. With higher hunter densities on public wildlife areas than private land, deer are easily pressured into refuge areas and state parks where no hunting is allowed. KDWPT often takes advantage of these situations, offering limited access, special-draw hunts, which provide unique and often productive hunting opportunities.

There are nearly 500 special draw deer hunts provided on Kansas public lands. Special hunts are part of Pass It On, the department's hunter recruitment and retention program. These restricted-access hunts are conducted on department lands, including state parks, wildlife areas, and refuges. The hunts also occur on WIHA, national wildlife refuges, city and county properties, and even some private lands. Special hunts limit the number of participants to ensure a quality experience or to achieve specific management goals such as herd reduction. Special hunt types available include those for disabled, youth, mentored hunters, as well as those open to all applicants. Special hunts only provide access to specific properties or portions of the property. Licenses, permits, tags, stamps, and hunter education certification are required unless exempt.

Where higher densities of hunters occur, some additional rules and regulations become necessary. Those rules and regulations may vary among areas and from year to year, so be sure to review current regulations.

Recent public lands regulation changes include: no baiting of big game, and hunters are restricted to two tree stands which must be tagged with hunter information. Portable blinds must be removed each day and decoys may not be left on the area over night.

Because we ask so much from our public lands, we generally manage them intensely. Public land managers on 29 areas conduct special deer surveys each year to monitor trends in the deer populations, including age and sex ratios, deer activity, habit preferences and deer densities. These surveys are coordinated with similar deer surveys conducted on private lands in each of the 19 DMUs. Survey results have shown that deer population densities on public hunting areas are almost always higher than average deer densities on private land in the same DMU. Habitat and hunter management on the public lands makes a difference.

Many public areas require free daily hunter report cards or are utilizing the new iSportsman electronic registration system. iSportsman provides instant hunter and harvest data that allows managers to make science-based decisions to improve wildlife populations, hunting programs and opportunities for deer hunting. You may learn more about deer hunting on public lands by contacting public lands area offices or visiting the KDWPT website, [www.ksoutdoors.com](http://www.ksoutdoors.com).



While public hunting lands make up less than 2 percent of the state, those areas were used by almost 14,000 deer hunters (12.1 percent of deer hunters) in 2014. Deer hunters killed nearly 5,000 deer on the public areas or 5 percent of the statewide harvest. The hunter harvest density of deer on public managed lands was 3.17 deer per square mile while the corresponding density on private land was 1.13. The density on private property open in the WIHA program is 2.09. The drawback of high densities of deer hunters is that individual hunter success is generally lower.

KDWPT wildlife area managers take pride in providing some of the best deer and wildlife habitat in the state, but many other species are considered and managed for. Managers evaluate and manage each area with a holistic approach. In general, upland areas are managed for small game and upland game birds, riparian or bottomland are key areas for deer and turkey management, while reservoirs, lakes and wetlands are managed to attract waterfowl.

As deer hunting continues to evolve across the nation and the popularity of private hunting leases increases, Kansas public lands will become even more important in providing opportunities that ensure a future for Kansas deer hunting.

## Antlers and The Role of Trophies

Lloyd Fox

When deer hunters get together, discussion often turns to antlers – their size, symmetry and individual peculiarities. Antlers seem to enhance hunters' memories. Antler and trophy collections also pique interest and curiosity among photographers, artists and others who don't hunt. Interest in antlers as trophies is not some modern-day phenomenon unique to our culture. Trophies have been preserved in pre-historic cave paintings and in Egyptian tombs. Bear skulls and other items from the hunt have been found in settings that suggest those items held a special importance in prehistoric society, possibly to the level of a religious ritual.

Antlers are certainly a part of what motivates many hunters to wake before the alarm goes off and suffer rain, snow, ice, wind and anything else mother nature has to offer during the deer season. And in some cases, the bigger the antlers, the greater the motivation.

The process of growing antlers is complex. Hormones regulate the timing, growth and development during the annual cycle, and there are a host of factors that influence the growth and shape of an individual deer's antlers. Antlers are grown anew each year of a buck's life, displaying one of the fastest rates of organogenesis known in the animal kingdom. Because of some unique physiologic characteristic of

antler growth, the process has been investigated by scientists working on cancer and osteoarthritis.

Even a male fawn produces rudimentary antlers. However, most of the energy and nutrition fawn bucks obtain is directed into body growth, while a small amount goes into developing buttons on the top of their head. The process begins in the early spring, almost immediately after a buck casts or sheds the set of antlers they grew the year before. Spreading over the exposed bone of the pedicle on the skull is a hair like membrane called "velvet." This tissue develops a rich blood supply that will nourish the new bone as it grows through the spring and summer. Antler growth starts slowly with little visible change the first weeks. However, as the season progresses, the growth rate at the tips of tines may reach a rate of one-eighth-inch per day. Antlers harden, generally in August. The velvet dries and bucks rub their antlers against trees to remove the velvet and polish the bone. Antlers are used in display behaviors, fighting and occasionally against predators. After the breeding season ends, hormone levels change and a special region between the pedicle and the antler weakens and the antlers fall off. The cycle is complete.

Unlike horns, which are composed of keratin, antlers are bone. These bony structures are dense in young bucks, but as a buck ages they produce more porous antlers. Occasionally a hunter will ask what is wrong with the deer in their area because many of them had broken antlers. The answer may be as simple as those bucks were in older age classes with less dense and weaker antlers.

Abnormal antlers always generate interest. Injury to the velvet membrane during the growth of antlers may result in deformities to the antlers. Another common phenomenon is called "contralateral antler malformation." This happens to a buck if one of his hind legs is injured. The antler on the opposite side of the body will grow in an abnormal way. Older bucks often grow some unusual antlers. One of the causes may be a broken or misshaped pedicle, which may occur during a fight with another deer, an accident with a vehicle or some other trauma. Occasionally a deer with a broken or split pedicel will develop a third beam. More rare is a phenomenon that happens when a deer produces an antler from bone other than at the pedicel. Those antlers may grow from the center of the forehead or off the bone around the eye. And then there are genetic and hormonal oddities. Hunters report taking a few female deer with antlers each year. Occasionally a deer will remain in the velvet stage of antler development. It's a condition called "Cactus Buck." It's generally the result of injury or disease that caused the deer to stop producing testosterone. Some of those specimens develop grotesque antlers with multiple abnormal points.

Antlers are categorized as typical and non-typical to

distinguish a classic symmetrical rack from one with antler points in abnormal locations. Frequently a deer develops abnormal points as it gets older. Kansas is considered a hotspot for deer with non-typical antlers. And a drop point, one growing downward off the main beam, is highly prized among hunters. No scientific study has identified the cause of that abnormality.

Growing antlers requires a great deal of resources, and the amount of energy and nutrition available varies depending on where deer live. The bodies of yearling and young male deer are still growing, so energy and nutrition is routed to that growth, leaving less for antler growth. Kansas' fertile soils produce excellent quality forage, and deer often produce remarkable antlers even at young ages. However, data from studies that followed individual animals through their life suggest that the largest set of antlers are produced when bucks were 5.5 to 6.5 years old. However, many events happen in the wild that may change the outcome. Suffice it to say that a 3.5-year-old buck in Kansas may have larger antlers than a 7.5-year-old buck from poor, overcrowded habitats. Invariably, the monster non-typical racks and large racks on mule deer come from older deer.

National registries of trophy class deer such as those maintained by the Boone & Crockett Club or the Pope & Young Club include many deer from Kansas. Kansas ranks among the top states for production of large deer.

For this article, we examined 50 years of entries into the Kansas Trophy Deer Award program, and we found that hunters had taken a trophy class white-tailed deer or mule deer in every county in the state. An average of 70 deer were entered per year and the average score was 158. These records showed no upward or downward trend through the years in either the maximum score or the average score of all entries each year. Trophy records show that the quality of the Kansas deer herd has been stable over the first 50 years of deer hunting.

By its very definition, a trophy-class deer is rare. There were 123,000 hunters in Kansas in 2014, and if 70 of them took a trophy-size deer, it would amount to a mere 0.06 percent of the hunters. We also need to recognize that trophy animals sometimes bring out the worst side of a segment of society. No aspect of hunting generates a lower non-hunter public approval than illegal hunting associated with trophy animals. Organizations like the Boone & Crockett Club and the Pope & Young emphasize legal and "fair chase" hunter behavior as a requirement for entry into their registries. Kansas deer management walks the tight rope on trophies by managing the herds to ensure nutrition, density and age structure to ensure that some truly memorable size deer will be part of the herd, while at the same time ensuring hunting opportunity will be available for as many people as possible.

Because of the interest and motivation of deer hunters to recognize deer with exceptional antlers, it is possible to monitor trophy records through years and

detect changes which may be happening with deer density and habitat quality. Trophies are but one of the antler metrics that are useful in monitoring deer and deer habitat. Deer managers in North America have frequently used the average basal diameter of yearling bucks as an indicator of the status of the herd.

## Deer: The Driving Force in Wildlife Conservation

Lloyd Fox

The term was unspoken at the time Theodore Roosevelt and a handful of scientists, sportsmen, military and political leaders, artists, writers and others changed the face of conservation in North America but they understood the concept of "Charismatic Megafauna." They knew that conservation depended upon public support. The public needed an image of what conservation promised. Mule deer and white-tailed deer were part of that image. Deer provided the image of beauty and grace found in the wildlife community. People across the continent rallied in support.

In the early 1900s, many believed deer and most big game were on the brink of extinction and that nothing that would prevent that fate. But our nation had not experienced the power of wildlife management nor the heart and deep pockets of American sportsmen. Today we can reflect on the tremendous successes in wildlife management, and we may point to what we now call the North American Model of Wildlife Conservation.

The status of deer has changed dramatically since those bleak days in the early 1900s. In recent years, C.J. Winand, Bowhunter Magazine, has twisted the arms of deer biologists throughout North America for his annual status update on deer. With a little extrapolation and a few assumptions, it appears that the number of deer in North America now approaches 35 million, at or above the level historians believe occurred before Columbus sailed to the shore of this continent.

A survey conducted by the USFWS in 2011 estimated there were 11.6 million big game hunters in the United States (~85 percent of all hunters hunt for big game and the majority of them pursue deer) and that they spent an estimated \$16.9 billion per year on hunting. That level of economic impact affects many people and businesses. Those hunters also buy deer permits and hunting licenses, funding the day-to-day operations of state wildlife agencies. In Kansas there were approximately 123,000 deer hunters in 2014. They purchased more than \$14 million worth of licenses and permits, which is 62 percent of the revenue obtain within the Wildlife Fee Fund for Kansas. The number of deer hunters in Kansas is large enough to provide a strong political and social support for conservation. The fund they provide are the life blood for the operation of most state wildlife agencies

## View of the Future

Lloyd Fox

At first glance, one can only marvel at the success of modern wildlife management to restore deer populations in North America. Population numbers are strong. It is hard to imagine a problem for these two species in the near future. At closer inspection, there may be a thunderhead inside that silver lining. Deer numbers are up, but so too are concerns about damage deer cause, both financially and ecologically. A few years ago the concept of "overabundance" dominated the discussion in deer management circles. Managers considered not only hunter desires, but social tolerance and ecological consequences of deer numbers.

White-tailed deer provide an example of evolutionary success with a wide distribution and robust diversity of sub-species adaptations. "Healthy" was the word we frequently used. That was before CWD appeared and bovine tuberculosis became established in deer populations in Michigan.

Deer management is not only applied biology and ecology, but also the art of finding critical social and economic compromises. False steps anywhere along the path may send even once successful deer management programs over the political cliffs of public support.

How about the hearts and deep pockets of the hunters? It cannot be assumed that their support will remain unchanged. During the era of scarcity, their support could be mobilized. Simple concepts and solutions such as "buck-only" hunting were easy to understand, appreciate and accept. In much of North America, the "buck-only" step in deer management turned out to be easier to institute than it was to remove when deer populations required alternative treatments.

The deer population in Kansas has gone from immense herds to near extinction and then back to levels some call overabundance. Today we are in an era of abundance and solidarity among sportsmen is more difficult to maintain. In the last 30 years, we have seen a proliferation of private organizations focused on one wildlife species at a time or one piece of hunting equipment or techniques, or even one goal when harvesting a deer. The craze for trophies is an example. At the extreme is pressure placed on state wildlife agencies to promote their goals at the expense of other sportsmen. Each of these organizations has administrative cost. They collect money from sportsmen and spend a portion on those funds raising more money. As generous as sportsmen have been in the past, they have limited resources. As they support their specialty organization, they may balk at requests for additional support for the state wildlife management agency.

The future is always off in a haze. We know there will be problems, many of which we can't predict. The future of the North American Model of Wildlife Conservation depends on people. Will the next generation educate and empower the best and the brightest to manage their deer population? Will leaders emerge with ability, courage, dedication and gumption – the Teddy Roosevelts of the future?

Just as the immense herds of bison stretching to the Kansas horizons were not a harbinger of perpetual success, the success during the last 50 years with deer management in Kansas is not a finished story. In the words of Baba Dioum, a Senegalese forestry engineer who spoke to the International Union for the Conservation of Nature and Natural Resources in 1968, "In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we are taught." 

50  
YEARS  
OF DEER



# 2015 SPORTSMEN'S CALENDAR

## FALL TURKEY

Oct. 1-Dec. 1, 2015 AND Dec. 14, 2015-Jan. 31, 2016

## DEER

Archery: Sept. 14-Dec. 31, 2015

Regular Firearm: Dec. 2-13, 2015

Firearm Extended Whitetail Antlerless Season:

Jan. 1-3, 2016 (Units 6, 8, 9, 10, 16, and 17)

Jan. 1-10, 2016 (Units 1, 2, 3, 4, 5, 7, 11, 12, 13, and 14)

Jan. 1-17, 2016 (Units 10a, 15 and 19)

Archery Extended Whitetail Antlerless Season:

Jan. 18-31, 2016 (Unit 19 only)

## ELK (residents only)

Outside Fort Riley

Archery: Sept. 14-Dec. 31, 2015

Firearm: Dec. 2-13, 2015 and Jan. 1-March 15, 2016

On Fort Riley

Firearm Season for Any-Elk Permit Holders:

Oct. 1-Dec. 31, 2015

Antlerless Only

Firearm Second Segment: Nov. 1-30, 2015

Firearm Third Segment: Dec. 1-31, 2015

## DOVE

Nov. 7-15, 2015 (*mourning, white-winged, Eurasian collared, and ringed turtle doves*)

## EXOTIC DOVE

Nov. 20, 2015-Feb. 28, 2016 (*Eurasian collared and ringed turtle doves only*)

## RAIL

Sept. 1-Nov. 9, 2015 (*Sora and Virginia*)

## SNIPE

Sept. 1-Dec. 16, 2015

## WOODCOCK

Oct. 17-Nov. 30, 2015

## DUCKS

### HIGH PLAINS UNIT

Oct. 10, 2015-Jan. 4, 2016 and Jan. 23-31, 2016

### LOW PLAINS EARLY ZONE

Oct. 10-Dec. 6, 2015 and Dec. 19, 2015-Jan. 3, 2016

Youth: Oct. 3-4, 2015

### LOW PLAINS LATE ZONE

Oct. 31, 2015-Jan. 3, 2016 and Jan. 23-31, 2016

Youth: Oct. 24-25, 2015

### LOW PLAINS SOUTHEAST ZONE

Nov. 14, 2015-Jan. 3, 2016 and Jan. 9-31, 2016

Youth: Nov. 7-8, 2015

## CANADA GEESE

Oct. 31-Nov. 1, 2015 and Nov. 4, 2015-Feb. 14, 2016

## WHITE-FRONTED GEESE

Oct. 31, 2015-Jan. 3, 2016 and Jan. 23-Feb. 14, 2016

## LIGHT GESE

Oct. 31-Nov. 1, 2015 and Nov. 4, 2015-Feb. 14, 2016

## SANDHILL CRANE

Nov. 11, 2015-Jan. 7, 2016

## GREATER PRAIRIE CHICKEN

Regular Season (Greater Prairie Chicken Unit):

Nov. 21, 2015-Jan. 31, 2016

Southwest Unit: No open season for prairie chickens

## PHEASANTS

Nov. 14, 2015-Jan. 31, 2016

## QUAIL

Nov. 14, 2015-Jan. 31, 2016

## SQUIRREL

June 1, 2015-Feb. 28, 2016

## RABBITS

Open year-round (*cottontail and jackrabbit*)

## CROW

Nov. 10, 2015-March 10, 2016

## TRAPPING/HUNTING

Nov. 18, 2015-Feb. 15, 2016 (*badger, bobcat, mink, muskrat, opossum, raccoon, swift fox, red fox, gray fox, striped skunk, weasel*)

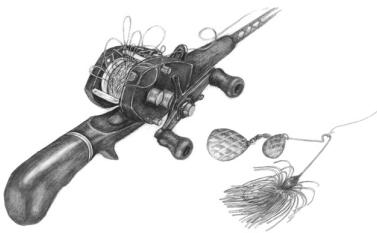
## BEAVER & OTTER TRAPPING

Nov. 18, 2015-March 31, 2016

## RUNNING

March 1-Nov. 8, 2015





# Backlash

WITH MIKE MILLER

## RARE AS BIGFOOT

We moved to Greensburg when I was 11, and I discovered pheasant hunting that first fall. It seemed like everyone I knew hunted pheasants. Those with pointing dogs hunted quail and I knew a few locals who hunted ducks and geese. However, I heard very few deer hunting stories around town. Deer were scarce.

The first deer I saw is still a vivid memory. It was November, 1972, opening day of my second pheasant season. I remember feeling the excitement of the pending hunt as our group's caravan snaked east out of town at sunrise. When I saw brake lights flash in the dust cloud ahead, I was confused. I knew we were miles from the fields we would hunt. An arm pointed south from an open passenger-side window on the lead vehicle and my eyes followed the line across the frost-covered wheat stubble. Just 100 yards from the road, outlined with dawn's golden light, a mule deer buck stood beside a bedded doe. More than 40 years later, I can still clearly see the image in my mind. At first, I wondered if they were real because the scene was perfect and they were statue still. Then the buck flicked one of its oversized ears, and there was no doubt.

I was skeptical, too, because we had hunted pheasants most weekends the year before, driving and walking miles without seeing a deer. Until that morning, seeing deer in this area of southcentral Kansas seemed less likely than seeing Bigfoot. I can't remember if we shot any pheasants that day, although I'm sure we did.

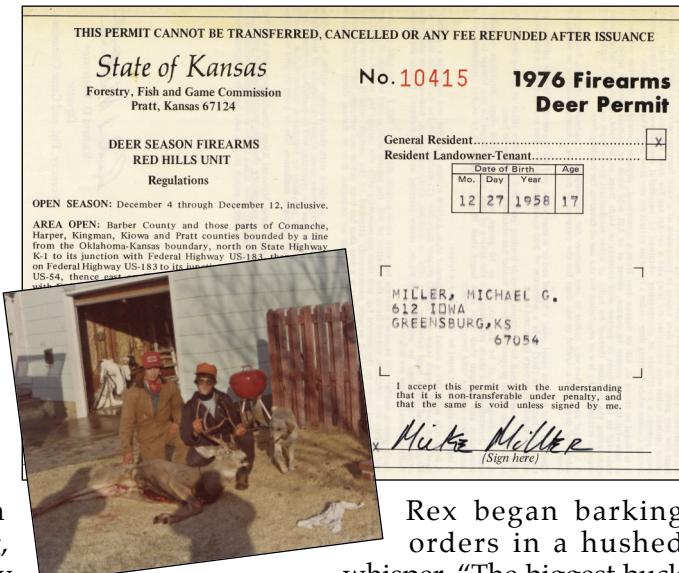
Several years later, my friend Rex and I began regularly seeing mule deer on the Greenleaf Ranch

south of town. Our families had fishing leases on the Greenleaf's pond, and they were generous when Rex and I asked to hunt. We made plans to hunt deer the next fall, 1976.

We got lucky and drew permits for the Red Hills Unit (Unit 16), and on opening morning, accompanied by Rex's dad and my granddad, we waited near a feed field on the ranch. No deer came out, but as we left, we spotted a small bunch of deer on the move. Rex was able to get into an ambush position and he killed his first mule deer buck. Granddad gave us step-by-step instructions on how to field dress the buck, and we skinned it in Rex's garage back home. For us, that was as much fun as the hunt.

The next morning, I woke to the sound of Rex's pickup running in the street in front of my house. I had overslept! (Rex might tell you I did that more than once.) I dressed quickly and dashed out of the house, but we arrived at the ranch just after sunrise. As we rounded the corner on the road north of the feed field, Rex hissed, "They're on the field."

We parked in a low spot out of sight and belly-crawled to the fence. As we lifted our heads we could see eight or nine mule deer on the field about 150 yards away.



Rex began barking orders in a hushed whisper, "The biggest buck is on the right. Shoot that one. Hurry!"

The deer were aware of us and were beginning to trot out of the field. Without thinking, I shot well over the back of the biggest buck, then, after hearing Rex whisper, "Shoot again, shoot again!" I did.

My second shot with my open-sighted .243 was true, and my first deer, a four-by-five muley buck, was down in a grass waterway at the edge of the field. Rex handed the binoculars to me, and I put them to my eyes. However, by then I was shaking so bad, I couldn't focus. I tried unsuccessfully several times before handing them back to Rex, "Here, you watch."

Between the two of us, we remembered Granddad's field dressing lesson from the day before, and we dressed the buck and loaded it in the pickup. I've taken many deer since, but I don't remember any as vividly as that first one 39 years ago. ♦

# The Nature Conservancy®



## The Nature Conservancy in Kansas

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# Respecting nature and tradition.

Hunting in Seward County in the 1890's.



TNC



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