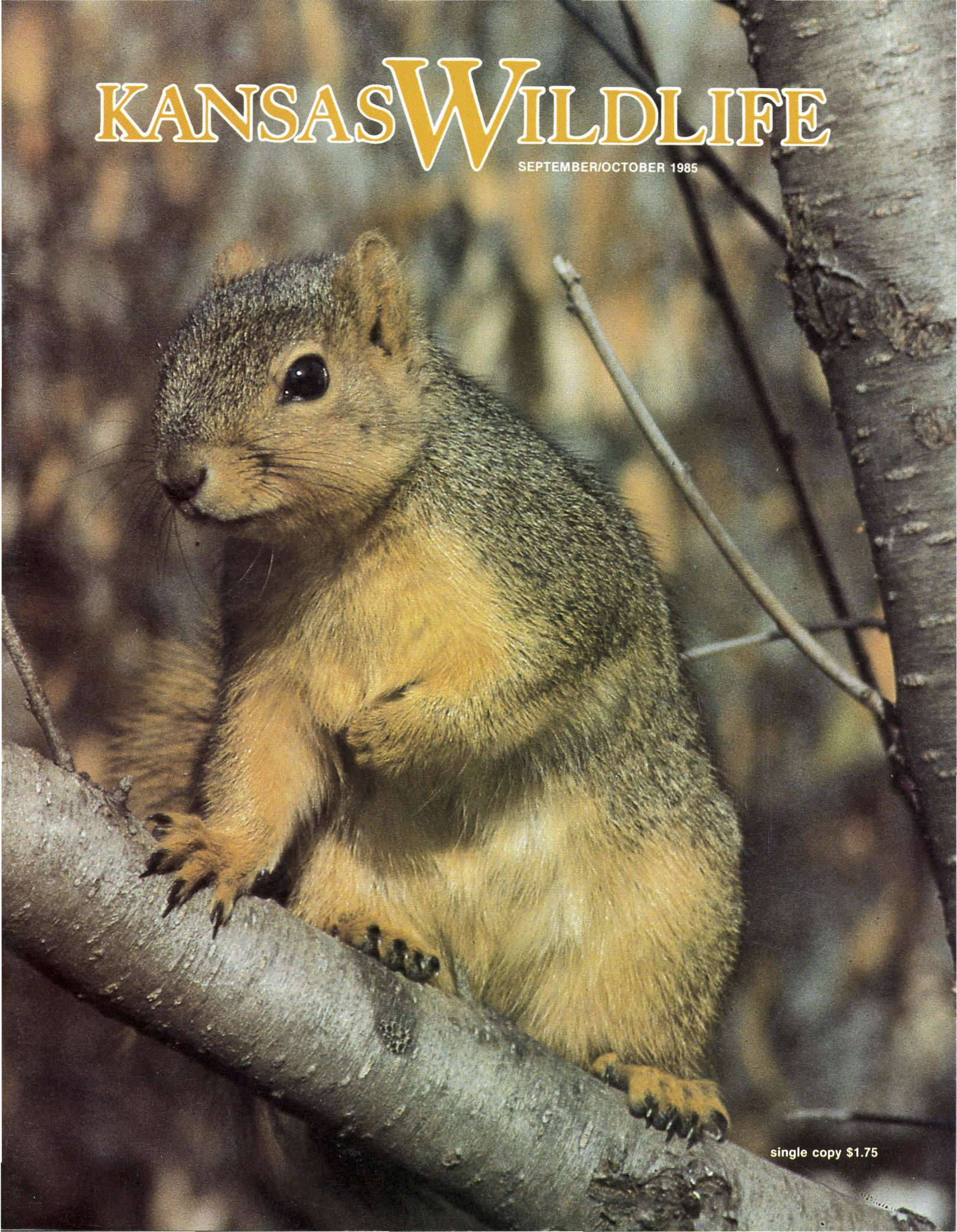


KANSAS WILDLIFE

SEPTEMBER/OCTOBER 1985



single copy \$1.75

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KANSAS WILDLIFE (ISSN 0279-9030) is the official bimonthly publication of the Kansas Fish & Game Commission, Rural Route 2, Box 54A, Pratt, Kansas 67124 (316) 672-5911. Subscription rates; one year (6 issues) \$6.00; two years (12 issues) \$11.00; and three years (18 issues) \$15.00. Single copies are available at \$1.75 per copy.

Articles in the magazine may be reprinted with permission provided proper credit is given. Second class postage paid at Wichita, Kansas, and additional mailing offices. POSTMASTER: Send address changes to Kansas Fish & Game, Rural Route 2, Box 54A, Pratt, KS 67124.

Postal I.D. Number: ISSN 0279-9030

Multiple Choice

You don't hear much about multiple use in Kansas. In western states, though, multiple use is the guiding philosophy for public land management. The term is heard so much in some circles it's become one of those expressions we never think about.

Maybe we should.

Multiple use is nothing more than the policy of federal agencies to milk the most out of public domain without destroying its integrity. That is, if cattle can be run on a piece of ground in summer, hunters accommodated in fall, and snowmobiles given access in winter, the land is supporting a good mix of recreation and commerce. Throw in a few timber sales and fly fishermen, and you have a healthy management program.

Because public acreage is for all practical purposes a finite resource that is being inundated by increasing user demands, the multiple use concept is a sound one. It is also politically expedient because people who get what they want don't ordinarily complain. Multiple use gives a lot of people what they want.

The only problem with multiple use is that eventually the profitability of commercial ventures and the quality of recreation deteriorate.

To most of us, logging isn't as objectionable as grazing on public lands, partly because Hereford cows don't look nice in an otherwise pristine campsite and partly because we've been sold on the idea that trees are a renewable resource. Nevertheless, both practices are subject to pressure applied by environmentalists for lower allowable cuts and higher grazing fees, by anglers angry over slash-blocked streams and fouled meadows, by hunters who gripe of log

truck traffic during big game seasons and argue that cattle destroy deer and elk winter range.

Having fun in multiple use country isn't as easy as it used to be. Hikers choke on the dust of pack trains that pound popular forest trails into ankle-deep channels. Snowmobilers scuttle the efforts of late-season elk hunters and harass migrating game when energy reserves are at a critical low. Archers are accused of disrupting the elk rut and of decimating herd bull numbers, leaving no mature animals for riflemen in later seasons.

Though these conflicts seem far removed from Kansas, they are not. We may have little public land compared to states like Idaho where over half the total acreage is federally owned, but multiple use is practiced here, too. Though we don't think in terms of vast acreages or of wilderness areas, it is in fact more realistic to consider what the land produces rather than its geographic displacement. Plants, animals, soil, minerals, water and that nebulous thing called wilderness quality must all be shared. Not only must we use wisely Nature's surplus, but we must distribute it in such a way as to provide optimum recreation for its co-owners and a fair profit for those who participate in its management. This means regulations will become more complex, outdoor opportunities more limited as demands on the resource increase.

Let's zero in on big game. Kansas deer hunters can now choose to carry a rifle, bow, muzzleloader or handgun. To accommodate bowmen, whose weapons are classed as primitive, a special season is provided. Frontstuffers and handgunners, armed a bit better than archers but still not as well equipped as riflemen, must hunt during the rifle season. Some would argue that the limitations of these short-range firearms warrant special consideration. Black powder shooters have it, in the form of a separate drawing that increases the odds of getting a tag. Handgunners must compete in the open rifle drawing.

As restrictions throttle outdoor opportunities, competition grows between groups for the most favorable options. Such rivalry can lead to a dangerous weakening of collective strength when larger issues are at stake. Battles for more hunting days or extra tags sap en-

ergy that could be used to fight habitat degradation or ill-advised protectionism.

Sportsmen are not the only ones affected by increased demands on the game resource. Landowner tolerance of hunters varies inversely with the length of the season. Farmers and ranchers who once welcomed the redcoats are now tired of seeing camouflaged bowmen poking around for a month either side of the firearms hunt or are miffed by the disregard for property shown by burgeoning numbers of trespassers.

Splitting hunters into groups to ease opening day pressure, increase game escapement and provide quality hunting is a popular ploy now; but it cannot go on indefinitely. The more groups there are, the shorter each season must be to avoid conflicts. That crowds hunters into fewer days, diminishing hunt quality. Landowners who close ground compound the crowding on open land.

Multiple use means, in effect, something for everyone. But not everyone's definition of something is the same. A successful hunt isn't just a dead deer for a lot of people, and hunters will soon have to decide how much subdivision in their ranks is acceptable. Landowners who bridle at long hunting seasons might do well to look at the economics of game farming and habitat development before they write off the hunter. We all must realize that there is no free lunch when it comes to slicing up a finite resource. Whether it be whitetail tags or pronghorn permits, goose pits or quail leases, bass ponds or turkey blinds or just quiet woodland trails — all are limited.

And every exclusive use is obtained at the expense of another.

the magic of

Metamorphosis

text and photos by Mike Blair



Metamorphosis is change. Specifically it is the transformation of one life form to another. The monarch butterfly is a product of metamorphosis. Its larva, a caterpillar, eats itself to a weight 2500 times greater than its hatching size in only three weeks, then encapsulates itself and hangs upside down from a branch. Ten days later a butterfly emerges on papery wings to soar above the dusty vegetation that spawned it.

The monarch's metamorphosis begins when the mature larva stops feeding and searches for a protected place to form its capsule (the case in which it will pupate and form a chrysalis). The caterpillar's body moves in undulating waves, powered by three pairs of primary legs near the front and many pseudo-legs along the remaining body segments. Its tiny simple eyes register only light and dark; peg-like antennae help find direction through feel.

In choosing a pupating site, the larva explores extensively, pausing often to wave its body through the air to feel for leaves and twigs which might blow against it in a windstorm. Even during this search, changes are taking place within the body. Certain glands release large amounts of moulting fluid, as they have in the past three moults. But this

time, a special juvenile hormone is absent; its absence will force this moult to produce a capsule.

When a resting site is selected, the caterpillar spins a silk button with specialized silk glands located near its large mandibles, then grasps the button with claspers located at the rear of the body. These special legs are fitted with hook-like crochets which attach to the silk like velcro fasteners. Then the larva settles into a hanging position.

During the pupal stage, and after its completion, a major physiologic overhaul takes place. Moulting gel is secreted on internal surfaces of the larval skin and powerful enzymes digest all but the skin's outer layer. This layer is then shed, leaving the pupa inside a green translucent membrane. The organism at this point is called a chrysalis.

Inside, the digestion process continues. Muscles begin to liquify and break away from the pupal wall. Blood components called phagocytes join with the enzymes to digest and absorb all larval structures. Most of the materials will be used for reconstruction. The secondary nuclei (production centers for new cells) which were not functional in the larva but scattered throughout the muscle tissue are now activated to form the new appendages and systems of the

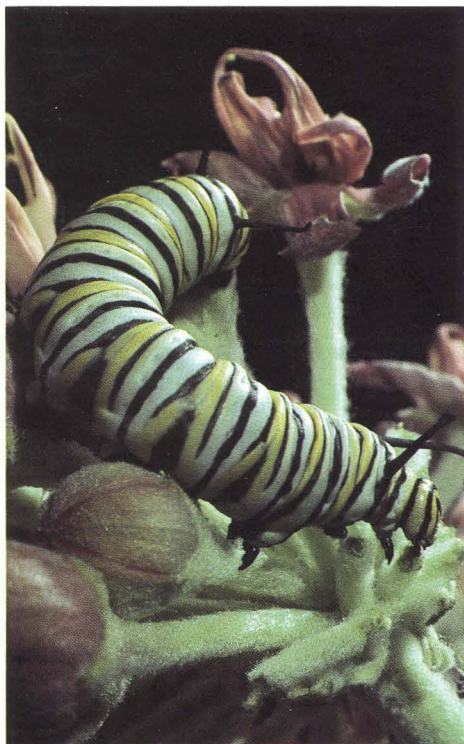
butterfly. In the head region, simple larval eyes are restructured into the more advanced compound eyes of the adult. Chewing mouthparts which previously fed on plant tissue now become a coiled siphon tube. Antennae elongate many times, with various sensory structures added to aid in finding a mate during adult life.

The thoracic region also changes dramatically. Large wings with a complex network of veins emerge from wing buds hidden within the caterpillar. Legs elongate and the pseudo-legs disappear. Heavy flight muscles develop, and the abdomen is formed. Gradually the chrysalis darkens, then clears, until the orange wings of the monarch can be seen through it. The gold flecks adorning the capsule now serve their purpose as light sensors, telling the creature inside when day is breaking. During the cool, still morning, the adult sucks air into its body to break the pupal case and crawls forth.

The shriveled wings unfold, aided by gravity as the insect hangs.

During the next hour, the distended abdomen recedes as blood fills the wings.

Then, without the slightest trace of clumsiness, the insect flies away. □



The monarch larva — a caterpillar — feeds voraciously on milkweed for about three weeks before pupating. A chemical in the milkweed gives the caterpillar a bad taste, which protects it from predators.



After spinning a button of silk on a carefully chosen twig, the larva grasps the silk with anal claspers, suspending itself upside down.



When a protective capsule is finished forming under the larval skin, the skin is quickly shed. The pupa then inserts a hardened peg (cremaster) into the silk button while letting go with the claspers of the discarded skin. If a mistake is made, the pupa falls to its death.



After the cremaster is inserted in the silk, the pupa wriggles vigorously to seat it deeply and firmly for the 10-day rest ahead. This minute-long flurry of activity is the only movement of the pupa during its rest.



The monarch chrysalis (pupa in its capsule) is marked with flecks of gold on a jade background. The reinforcing threads in twig angles above it were placed there by the larva to ensure stability.



Just prior to emergence, the chrysalis clears to reveal the butterfly inside. Now the gold flecks serve as light sensors, telling the creature when light conditions are favorable to emerge.

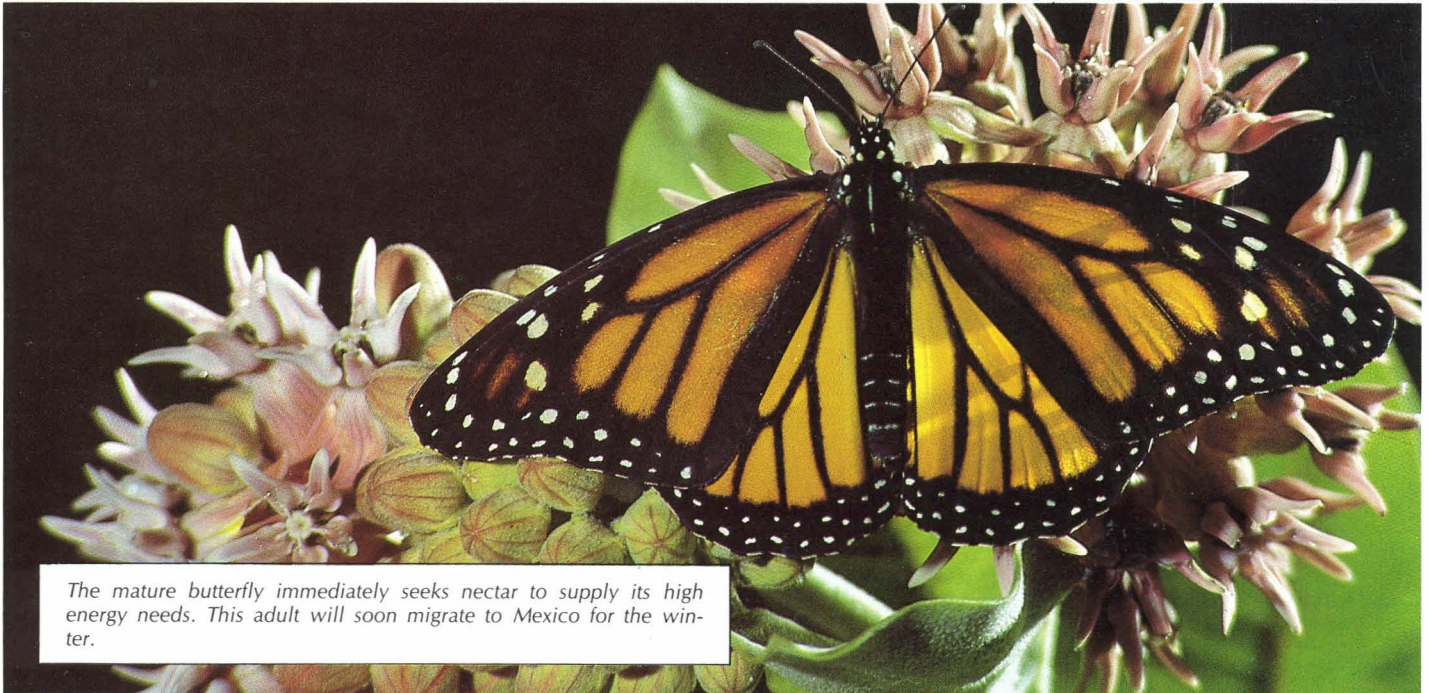


Emergence usually occurs on still mornings. Slowly the butterfly muscles its way free of its brittle, transparent case. The insect is weak and fragile-looking, but complete in color and form.

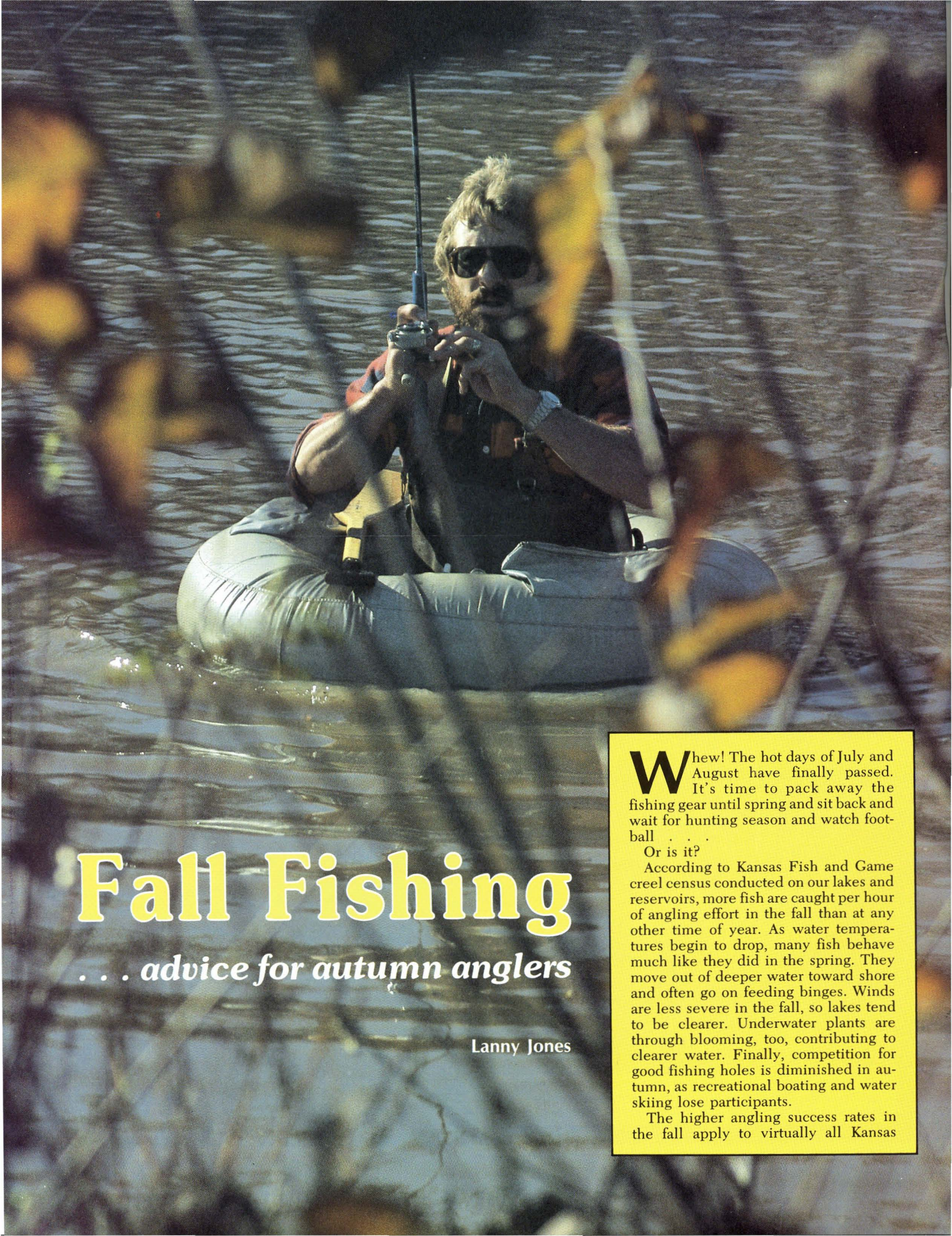


The newly emerged monarch has wet and crumpled wings. They must be dried and "inflated" before they are functional. The large abdomen containing most of the body fluids gradually recedes as the wings expand.

After an hour of drying near the chrysalis, the butterfly is ready to try its wings. Pumping the wings expels pupal waste products.



The mature butterfly immediately seeks nectar to supply its high energy needs. This adult will soon migrate to Mexico for the winter.



Fall Fishing

... advice for autumn anglers

Lanny Jones

Whew! The hot days of July and August have finally passed. It's time to pack away the fishing gear until spring and sit back and wait for hunting season and watch football . . .

Or is it?

According to Kansas Fish and Game creel census conducted on our lakes and reservoirs, more fish are caught per hour of angling effort in the fall than at any other time of year. As water temperatures begin to drop, many fish behave much like they did in the spring. They move out of deeper water toward shore and often go on feeding binges. Winds are less severe in the fall, so lakes tend to be clearer. Underwater plants are through blooming, too, contributing to clearer water. Finally, competition for good fishing holes is diminished in autumn, as recreational boating and water skiing lose participants.

The higher angling success rates in the fall apply to virtually all Kansas

waters — streams, ponds, small lakes and reservoirs — and just about any type of fishing. You can expect heavier stringers of white bass, walleye, crappie, catfish, black basses, bluegill, drum and other species.

Many reservoirs that have good white bass stream runs in the spring may also have a fall run. It doesn't happen every year, but it can occur when gizzard shad congregate in the rivers in October and November. These runs have lasted for as long as a month. Trolling or drifting jigs and shad-type lures is generally productive — especially around points and dropoffs. If small shad are available in the lake, they can be seined and used for bait. You can catch white bass in water six to eight feet deep during the fall.

Walleye are difficult to locate and catch during the hot months, but as fall rolls around and water temperatures drop, they become more vulnerable as they move into shallow water to feed. Rocky points, submerged islands and mud flats next to deep water are good places to fish for walleye. Some folks contend that ledges or breaks around 20 feet next to deep water are perfect for walleye in the fall. However, walleye do move into the shallows come evening, and many are caught in water less than six feet deep! Depth finders are very handy in locating the dropoffs, submerged structure and changes in bottom composition from mud to rock. Many lures will take walleye, but slab spoons and other shad-like lures bounced off the bottom are best.

Crappie move closer to the shoreline in the fall, but are not as shallow as they are during the spawning season. Good crappie catches occur along rocky shorelines and riprap of dams as well as near submerged brushpiles. Structure that produces crappie in the spring will also produce them in the fall. Some crappie stay in front of the gates on the reservoirs during colder months. As with spring crappie fishing, your best bet in the fall is to use minnows and jigs.

Wind plays an important role in fall channel catfish angling. At Fall River, Marion and Toronto Reservoirs, for instance, several days of north winds seem to "pile" large numbers of gizzard shad along the dam face and gate areas. This congregation of shad attracts large numbers of channel catfish. The best angling doesn't last too long, but many large channels are taken by alert anglers.

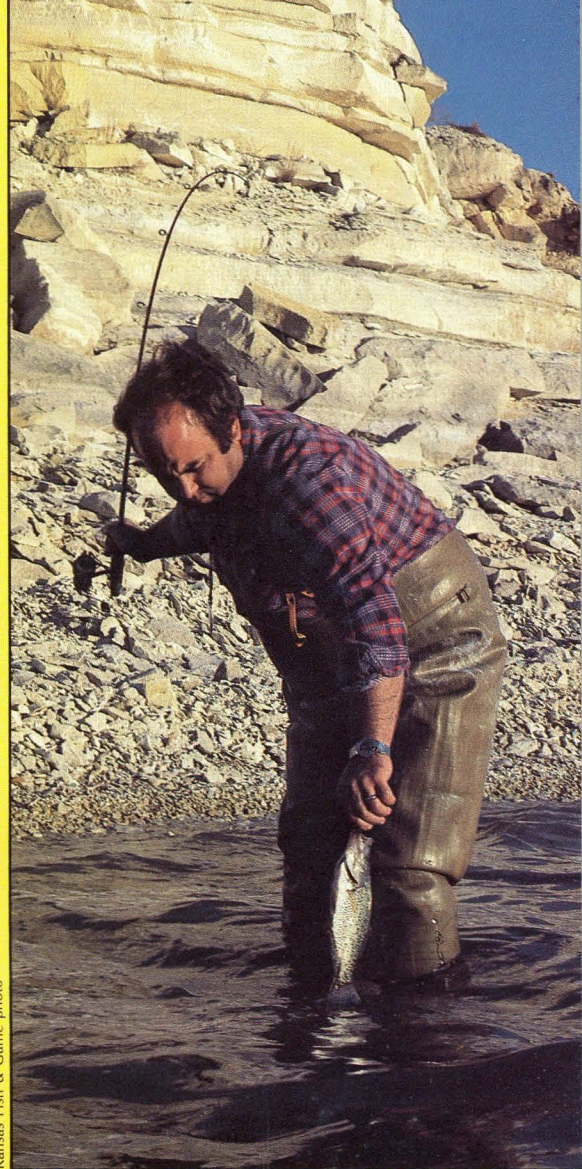
The black bass species (largemouth, smallmouth and spotted) all frequent the shallows a little more in the fall than during late July and August. Many anglers have a favorite type of lure or bait for fall bass fishing, but the kinds of spinners, crank baits and plastic worms

that work in the summer will also produce in the fall. Points, weed beds and brushy areas along shorelines or in coves give the best results. The Kansas record smallmouth was taken from Milford Reservoir in late October, so big bass *can* be caught during this time of year!

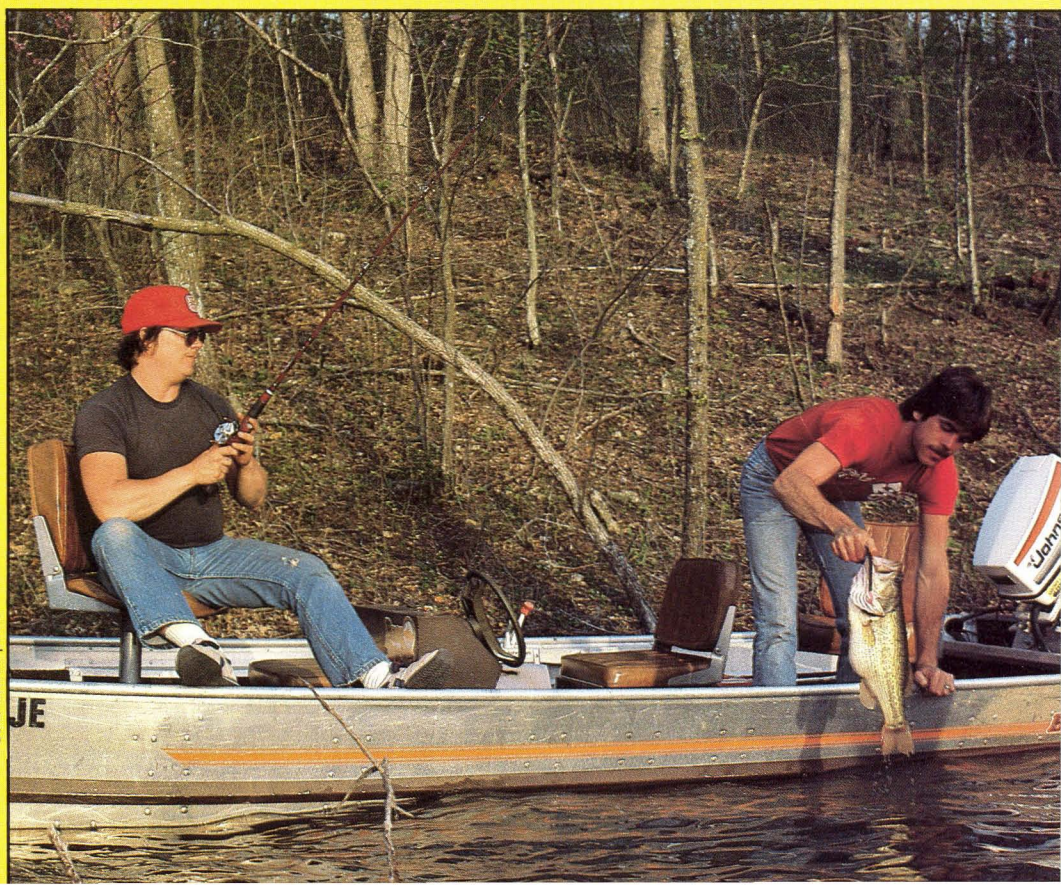
You have to work a little harder for bluegill in the fall than you do when the fish are guarding their nests in May and June, but they still hit hard and you can catch more than you want to clean. Worms, grasshoppers or small (1/64 oz.) jigs are all good bluegill catchers. A dainty hook (8-10) is necessary because bluegill have a very small mouth. These fish don't demand that you invest in depth finders or other special gear. Just casting from shore around cattails or weed beds, stick-ups and coves can be exciting. Bluegill can even be caught by ice fishing and are not as dormant when the water cools down as was once believed.

If you're fishing for walleye or white bass in the fall, you are likely to catch some drum, too. Some fishermen go out specifically for drum. This species isn't as vulnerable in fall as it is in July and August, but savvy anglers can catch a creelful. Worms, crayfish and cut shad fished on the bottom are the best baits. Drum is, incidentally, a fine-eating fish if properly prepared.

This year don't put away your fishing tackle until you've given fall fishing a try. You might even want to combine a duck hunt with an angling trip. Remember, the weather is great and so is the fishing! □



Kansas Fish & Game photo



Gene Brehm photo

Building Kansas Trails

Richard P. Douthit



Phyllis Epps illustration

Determined to make scenic Kansas more accessible — and keep accessible areas scenic — these Kansas hikers provide a service to us all

Every outdoors enthusiast can benefit from more and better hiking trails. That was our premise when some friends and I organized the Kansas Trails Council more than a decade ago.

It all began on a bitter day in January when the Kansas Trails Council fielded its first team of scouts to study the trail potential of the corridor along the eastern shore of Perry Lake. My canteen froze solid that day, hanging on my back in a small backpack! We did the job, though, and in the months and years that followed we created a delightful woodland trail stretching some fifteen miles between the Slough Creek and Old Military Trails campgrounds. During that project, and in all our projects since then, we have often sat around the campfire at night, or snuggled up to a windbreak during the day, and talked about what we're doing. We wanted to learn how to do it better and faster. What has emerged is a series of steps we—you—must take to build a trail right. Here they are:

Permission

Wherever it is, a hiking trail entices people to walk it. In every project we've done, there have been people walking behind us the same day we made the clearing. The owner of the land, or the manager, must be aware from the start that people are going to walk a marked footpath, sometimes in crowds. The first step in building a backpacking trail is to get permission from the landowner, making clear that public use of the trail is its intended purpose.

Feasibility

In the early days, we didn't spend much time studying feasibility. We just walked around in a place until we figured we could see a good path through it, talked it over briefly with the landowner, mustered the crews we needed and cleared the trail. We don't operate that way any more. Besides the obvious geographical and topographical considerations, there are those concerning land use conflicts and maintenance.

How will trail use change with the seasons? Will it conflict with a landowner harvesting crops or pasturing cattle? Will cultivation, irrigation or flooding make the trail unusable? Can maintenance be conducted at any time?

The maintenance of any trail, incidentally, is fully as important as its construction. But the same people who are eager to build a trail may not be as enthusiastic in maintaining it. Early in the Perry Lake project we assumed we could find a number of organizations that would help us build the trail, then take care of it forever. It didn't work out that way. Recognize, before you start a trail project, that its value hinges on

perennial maintenance! It may follow a topographically feasible route and be in harmony with other land uses, but if its upkeep is not assured, it is not a feasible project!

Scouting

There is no clear line between the feasibility and scouting phases of building backpacking trails. You'll do many hours of scouting before you know you have a feasible project. The best time of the year for scouting is winter, when the days are cold and bright and the leaves are off the trees. It's wise to refrain from dropping many flags initially. What you're actually doing is finding the best path and recording it in the memories of the scouts. We have pulled down as much as a mile of flagging because we stopped scouting and started flagging too soon.

Flagging

Sooner or later you're going to start making decisions about where to put the trail. We mark the route with blue surveyor's tape, hanging a streamer here and there on convenient twigs and branches. We flag it lightly at first, until we are sure of what we want to do. Later, we put up plenty of flags, so the clearing crews know exactly where to do their work.

Clearing

On the first Perry Lake project, we were surprised to find how quickly a group of eight or nine volunteers, using loppers and small bow saws, can clear a beautiful path through the woods. In fact, the scouting and flagging can take three times as long as the clearing! For the first clearing, we simply open up a six- by eight-foot path which can be walked by a tall man wearing a backpack. We take out only small trees and brush, routing the trail around any larger trees. During the clearing phase we don't pay much attention to the tread (surface character) of the trail, though we will look for good tread as we choose the path. As we go along we do some reflagging, for we want the trail to be noticeable and inviting from the start. The sooner people walk it, the sooner their feet will tell us if we've done our work well. Furthermore, the flags may be the only trail markers for some time.

Refinement

Sometimes we make mistakes! At Clinton Lake, for example, the scouts who preferred to walk near the lake won the argument too often — our trail went under water when the lake caught heavy rains. We've had to go back there and move the trail higher on the hill in several places. Every design decision is a judgment call, and even the best plans

of the designers can go awry. Many refinements, of course, are minor matters. In rough terrain the tread may need to be smoothed out. Here and there some rocks may need to be moved. Occasionally we've even had to build steps. If you're smart, you won't hurry this refinement phase. Enlist the feet of the people who hike the trail and you'll make it a better place to walk.

Cleanup

One good way to make a trail a more pleasant place to walk is simply to clean it up. Haul the junk out. Pile the brush down in a gully for wildlife cover. Make the path appear natural. Later, when you walk by, you'll like it better. Proper cleanup can do a great deal to make any trail more attractive.

Blazing

Early on we discovered that blue surveyor's tape made the best flags. It's visible in all seasons of the year and it doesn't fade as quickly as some of the other colors. When we started looking for more permanent markers, we found a blue paint used on the Appalachian Trail to mark connecting routes. (The primary trail from Maine to Georgia is blazed with white paint.) The blue paint we're now using is manufactured especially for us by a company in New Jersey. It's a "boundary marking ink", designed to last for many years in the outdoors. We usually make the blaze on a tree, sometimes on a rock, and about at eye level. In putting up these markers we follow the standard practices of the Appalachian Trail maintainers. We want to leave the trail marked for the person who hikes it the first time and who may need reassurance as well as direction. The blue paint blazes have become our trademark, and we are campaigning to make them the standard for our state.

All across America volunteers like us are mobilizing to work with federal, state and local governments to create and maintain the hiking and backpacking trails we need. In the East thousands of volunteers rally each year to keep the world-famous Appalachian Trail functional and attractive. The same kind of cooperative effort is creating the Pacific Crest, Continental Divide, North Country and Florida National Scenic Trails. Add to that thousands of miles of National Recreation Trails, including a hundred miles right here in Kansas.

You can be a part of this movement. Get in touch with some of us. Work with us on a project. Join the Kansas Trails Council. If nothing else, just go for a walk on one of our trails, and invite a friend to go with you. Discover trailside Kansas — you'll fall in love with it. □

Gentleman Bob

Roger Wells



The classic southern gamebird, our bobwhite quail is also a songbird of sorts and a survivor of commercial agriculture. Here's his life story.

The bobwhite quail has long been a part of Kansas' outdoors. In his 1891 book "History of Birds of Kansas", N. S. Goss sites instances of bobwhites nesting near a farmer's doorstep in Woodson County during the spring of 1867, of military men and hunters finding the bobwhite in 1864 on the Republican River and in 1862 along the Cimarron River. In 1937 noted Kansas paleontologist C. W. Hibbard discovered, in a rock outcrop in Meade County, the fossilized remains of a quail that had lived in the area during the Pliocene period about a million years ago!

Bobwhites are still to be found in every county of Kansas, with numbers generally increasing from west to east. Populations in western Kansas fluctuate widely due to weather conditions and limited cover. Southeast Kansas brushlots and fencerows still claim the largest and most stable populations of bobwhites.

This bird's mating ritual begins early in the spring, when the males begin calling. If the days are bright and warm, territorial displays of the male can begin as early as January, but more commonly occur during March and April. Each cock will challenge other males in the area and vigorously run off lesser birds. He will court a hen with displays very similar to the struttings of a turkey gobbler. He'll fluff his feathers to look larger than life, drop his wings to his side, and strut in circles around his selected mate. The hen initially pays little attention to all these antics but eventually allows herself to be claimed. Paired birds remain with the covey until mid-April.

The nesting season starts sometime in April or early May. The warmer the spring period, the earlier nesting is begun. Early nests usually contain more eggs than later nests, and survival of the young is higher too. In Kansas about 3% of the total statewide quail hatch comes

off the nest in April, with 16% in May, 58% in June, and 20% in July.

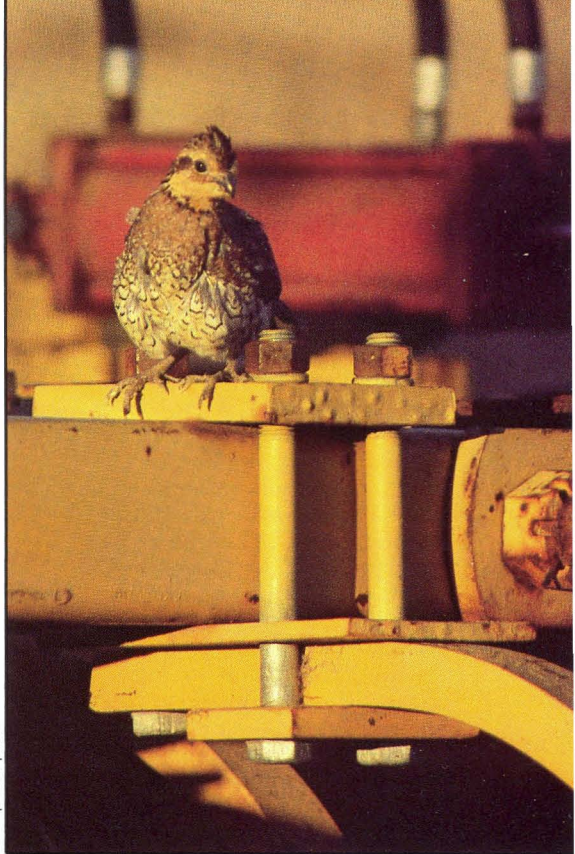
Quail nests are almost always found within 50 feet of a roadway, trail, field border, or some similar change in cover type. In an Iowa study, 45 of 46 nests were within 11 feet of the edge of heavy cover and almost half were less than four feet from the edge. Good nesting cover is essential for healthy quail populations.

The nest itself is rather simple. The hen will scratch a shallow depression a couple of inches deep and four or five inches across near a clump of grass. Almost all quail nests are made so there is only one entrance, with some type of overhead cover.

As egg-laying time approaches, the pair becomes more possessive of their territory. The male continues to call. Even pen-raised birds have been known to call during the night just prior to egg laying; and, rarely, the hen will even call.

The first egg is usually laid one or two days after the nest is built. The hen will visit the nest daily but briefly, depositing one white egg per day (occasionally skipping a day) until the clutch consists of from 12 to 18 eggs. Fewer eggs are laid during successive nesting attempts, and hens in poor condition raise smaller clutches. During the summer of 1979, after an unusually bad winter in eastern Kansas, hens delayed all nesting attempts until well into May and brought off much smaller broods than normal. This was because hens came out of the winter in very poor condition.

While the hen is building her clutch, the quail pair may loaf or feed in the general area of the nest, but they take care not to spend too much time at the nest site. A hen equipped with a radio transmitter during the summer of 1985 visited her nest site daily, but spent most of each day along a brushy prairie draw, ranging as far as 300 yards from the nest.



Ron Spomer photo

Quail live in "edge" habitat near agricultural land. They tolerate human disturbance very well and thrive under regulated hunting. This bird seems to be paying her respects to the farm implements that feed her.

The 23-day incubation period starts from one to seven days after the last egg is laid. No incubation is started until the hen is through laying. This ensures that all her eggs start incubation at the same time and that all will hatch on the same day.

Incubation is a dangerous time for the hen and her eggs. Ground predators of all types take great delight in adding quail or eggs to their daily menu. Coyotes, skunks, raccoons, bull snakes, and crows are among the better-known culprits. Nest losses are higher in areas where the hen has to resort to narrow, easily-searched strips of cover for nesting, like skimpy fence lines. These act as natural travel lanes for predators, and nests are easily found. Nesting success is usually pretty low due to the impacts of nest predators. In an Illinois study of 352 quail nests, 39% hatched, 36% were abandoned, and 25% lost to predators. In Iowa, 28% hatched on the first attempt and 72% failed, in Texas 46% hatched and 54% failed, and in a Georgia-Florida study involving 602 quail nests, 36% hatched and 64% failed, of which 37% were lost to predators and 20% abandoned.

If the hen loses her clutch she will readily search out a new nest site and start the process all over again. Successive clutches are generally smaller and chick survival poorer, but reneating is a necessary survival practice. In Kansas we have an additional problem with late summer nest attempts during hot dry weather. If the hen is building her clutch and daytime temperatures exceed 100° F, incubation may start in some of the eggs. As the eggs cool at night these embryos then die. If the hen successfully completes a clutch and starts incubation, excessive heat can again cause problems. Extremely hot temperatures can kill the embryo in the egg or, at hatching, cause the egg membrane to become so dry, tough, and leathery that the young cannot escape the egg.

During incubation the hen will spend almost all her time brooding the eggs. She may leave the nest for short feeding forays but will generally not venture far even then. If something should happen to the hen during this time, it is not uncommon for the male to take up the

continues around the egg, leaving only a small strip of membrane attached at one spot, resulting in something akin to a hinged doorway. All this time the chick has been kicking and squirming and peeping to the hen, who waits patiently, offering nothing but encouraging peeps and clucks of her own. Within a few hours all the eggs in the clutch have hatched, and the chicks are dried off and are running around, ready to explore the world and search for their first meal. For the hen, it signals the end of a 47- to 55-day process of nest building, egg laying, and incubation. The cock now joins her, and together they lead the young away from the nest. To linger near it would be invitation to disaster, what with the odors of hatched eggs hanging in the air.

The male and female share responsibilities in caring for the young. Both will search out choice morsels and offer them to the chicks. Both brood the young at night and during storms. The chief food for the young at this time is insects. The birds are growing fast and need the high protein that can only be

“About 80 percent of the quail that hatch . . . will never see the following nesting season.”

task of incubation and brood rearing. Throughout the incubation process the attending parent will rotate the eggs daily so the embryo may develop properly.

As the 23rd day of incubation approaches, changes start to take place in the egg shell and membrane. The membrane thins and becomes more pliable, while the shell becomes more brittle. The egg tooth on the upper part of the chick's beak is now fully developed and ready for its one and only purpose: to chip the shell so the chick can escape its confinement. The hatch starts with the pipping of a small hole on the side of the shell at the large end of the egg. Pipping

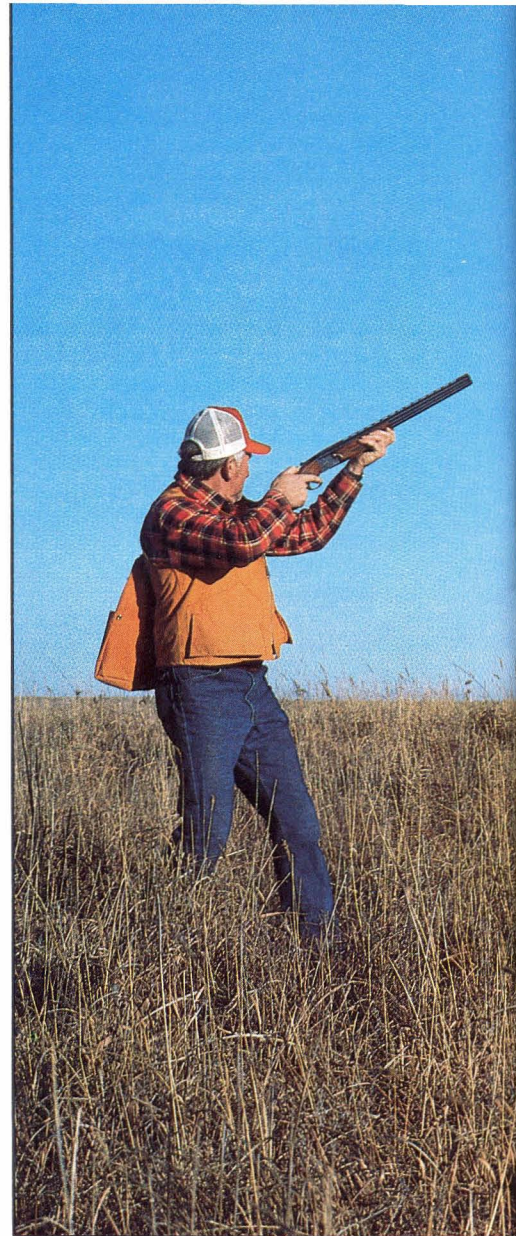
had from catching beetles, grasshoppers, and other insects. At hatching, the chick weighs only about 2/10 ounce and will double its weight every 10 days for the first five weeks. By the eighth week the chick is half-grown at about 3½ ounces.

The first weeks of life are dangerous ones for the chicks. If the ground cover is too dense, young quail often become separated from the rest of the brood and die. Predators take their share, and accidents are common. The adult birds try to protect the young and in doing so impart survival knowledge to the birds. Predator evasion is one of the key lessons to be learned. Any quail that aspires to live long enough to raise a family of its own must first learn how to use protective overhead cover to conceal itself from airborne predators and how to sit motionless at the approach of any ground predator. About 80 percent of the quail that hatch in a given year do not learn these lessons in time and will never see the following nesting season.



Ron Spomer photo

Cock quail have more contrast in their head plumage than the hens, though both sexes are the same size. Unlike pheasants, quail are monogamous; male and female tend the nest together.



By late summer in Kansas the average brood size will be reduced to nine to eleven birds. Throughout this period, however, there has been much swapping of individuals between broods whose daily ranges overlap. It appears that the young don't really care that the adult they follow is not their own parent. The common sight of late-summer quail broods containing several ages of young inspired the myth that one pair will raise several clutches. This does not occur.

The chicks are hatched with a light fluffy down, but feathers start growing almost immediately. By the time the chicks are four days old the first primary feather is in, and by ten days of age they can make short-distance

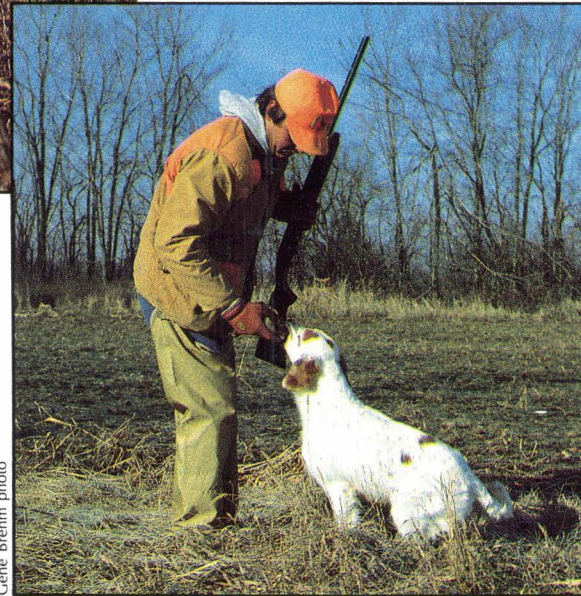


Gene Brehm photo

Quail hunting is a gentleman's sport, the most genteel of gunning games. But there's nothing stuffy about a covey rise! Like brown shrapnel, birds burst forth in every direction, each hurtling form a blur of motion. Just picking a target is hard, and much of the time you miss.

flights. By the time the chick is four weeks old juvenile plumage covers its torso. By the sixth week all but a few remnants of natal down have been replaced by juvenile feathers. By the eighth week the first adult feathers begin to show, and at 15 weeks the chick has its full adult plumage. Biologists can use the pattern of primary wing feather replacement to determine the ages of immature birds. The first primary feather drops out at 26 to 30 days of age and is immediately replaced. During the replacement of the first primary the number two primary is dropped and replacement begins. This process is continued for primaries one through eight (primaries nine and 10 are not replaced), with primary number eight completely regrown at about 150 days. Just by looking at the wings of a quail, biologists can determine if the bird is over or under 150 days of age and, if younger, can give a close guess as to the hatching date.

As the broods mature they begin to respond more as a covey unit, flushing together and taking the same flight path to escape danger. When danger approaches they will move as a group to an area where they feel secure and there sit motionless. By fall the broods have formed their coveys and are settled into definite home ranges. This range can be anywhere from 10 acres in the Flint Hills and prairie areas to 40 acres in southeast Kansas farmlands. The selection of a home territory is by no means a random process for the birds. Coveys will pick spots that offer a good supply of seeds and protective cover in the same locale. Most coveys like to locate where two or more cover types are close by. This eliminates the need for any long-distance movements to and from food supplies or protective cover. The home range at this time will almost always include some form of brushy cover. Even in the grassland areas of



Gene Brehm photo

Kansas, where quail coveys are often found feeding on weed seeds, they will seldom be more than a couple hundred yards from some type of brushy cover.

High-energy food supplies are extremely important during the fall. Although four out of five birds in the covey are young and know nothing from individual experience about Kansas winters,

something internal tells them to eat heartily and accumulate fat reserves. Seeds of western, giant, and annual ragweed, sunflowers, lespedeza, sorghum, corn, soybeans, croton, and millets are readily taken. The quail will put on weight quickly, depositing great reserves of fat around the internal organs and near the crop and thighs. During normal years quail weights peak at about eight ounces just before winter.

The selection of good winter territory is a critical choice for a quail covey. If the winter headquarters is ill chosen or

tabolisms are such that they use more energy than others often carry less fat. A bird with little fat has a lesser chance of living through periods of cold and snow. It is during periods of extended cold that adequate supplies of high-energy seeds such as ragweed or grains like milo and soybeans can mean the difference between survival and death for a quail covey.

In a study of food plot use on Fort Riley, it was found that quail coveys living within 600 meters of food plots had significantly higher stored fat re-

Game Warden J. B. Doze made the observation that "Kansas has an example of what a long closed season will not do. There are few more quail, if any more, at the end of a recent five-year closed season than at the beginning." Since then hunters have had the opportunity to hunt quail every year, always under biologically-sound restrictions. Bobwhites have prospered.

In the past 15 years Kansas has become one of the premier bobwhite states in the nation, with from 140,000 to 160,000 sportsmen taking an average of two million birds annually. Well over half of all Kansas hunting license buyers hunt quail, though an average quail hunter will go afield only five to six days per season, take from two to three birds per trip, and harvest anywhere from nine to 18 birds a year. The length of the hunting season seems to have little effect upon these statistics. Still, the population level of the birds is directly correlated to the state quail harvest. The relationship is so strong, in fact, that

"... shooting too many quail is rarely a problem in Kansas and occurs only on the most intensely hunted areas ..."

if few good areas exist, the birds will be forced to endure the full brunt of savage winter winds, expending huge amounts of energy merely staying warm. In addition, they may have to travel great distances to find food. Coveys in marginal winter habitat quite often perish before the warming days of spring bring a reprieve. Some coveys move from one area to another as winter snows deepen. When this happens the birds expend precious energy and expose themselves to predation.

During fall and winter a covey's daily activity normally starts with "covey calls" at the first light of day. Generally these calls are made by birds that have become separated from the group and are forced to roost separately. Feeding usually begins as soon as there is enough light to see. If there has been a heavy dew during the night, the birds will be reluctant to walk through the wet grass, preferring instead to stay along the drier paths and roadways or field edges. If the morning is extremely cold the covey may not emerge from its roost until after the sun is well up; but even on frigid days the birds are soon forced to break away from the roost and search for food. These feeding forays may be very short, with the birds returning to the comfort of a roost by mid-morning.

Even in the best of habitats and in the absence of hunting, natural mortality takes its toll on bobwhites. Individuals that are less efficient feeders or those whose body me-

serves than birds living more than 900 meters from grain. Those far away had a winter diet of low-energy seeds, leaves, and assorted items. Those living close to the food plots regularly used the grain in the plots and therefore were heavier.

As covey size is reduced through weather, predation, or hunting, the remaining birds may join with other covey remnants. Recent work in Florida indicates that when two or more small groups come together like this they may travel and feed as a unit, but the members of each original covey maintain a strong covey bond. Researchers have seen these birds, identified as individuals by radio transmitters, even roost separately in sub-groups.

Hunters and landowners should recognize that depleted coveys regroup during the winter and should avoid overharvest in small areas. Many sportsmen say that they never shoot a covey below about six birds, always leaving enough for "seed." A better policy would be to take no more than one-half of the estimated fall population. Luckily, shooting too many quail is a rare problem in most of Kansas and occurs only on the most intensely hunted areas or in areas of very limited and restricted quail habitat.

Kansas has long been a fine quail hunting state. Interest in the birds by sportsmen has resulted in better bobwhite management. In the 30 years following statehood the quail hunting season was from 62 to 211 days in length with no bag or possession limits. This was followed by a 20-year period during which seasons were from nine to 61 days in length and bag or seasonal limits instituted.

In 1924, after a period of off-again on-again quail seasons, State Fish and



Winter can be tough on quail. Prolonged cold or crusted snow or freezing rain can kill bobwhites by the hundreds. The birds bounce back quickly, though, given adequate nesting and winter habitat.

following the final October quail population survey, biologists can predict what the statewide harvest will tally, what the average daily take will be, and even how many days the average hunter will hunt. All this even before the first shots are fired! Our ability to reliably forecast quail populations from the various KF&G and rural mail carrier surveys allows us to inform the hunting public of quail population levels across Kansas.

Why go to the trouble of censusing quail? Because it's part of good bobwhite management first of all, and because thousands of Kansans are interested in the welfare of this sporty little bird. Perhaps the most important reason, though, is because the Fish and Game Commission must see to it that future generations of Kansans can awaken to the clear springtime call of "ah-bob-white." □

the center section

Edited by Rob Manes

LETTERS

QUESTIONS

Dear Editor:

The article on commercial harvests of wildlife "Should We Market Our Wildlife?" in the May/June KANSAS WILDLIFE deserves a response.

First of all, the article gave examples of "success" which seem questionable. Red deer in New Zealand (not native) may very well have made the habitat they occupy as unsuitable for native species as cows would have.

It is implied in the article that Europeans condemn poaching of wildlife because they have commercial value. The difference from American values (not as great as implied) is more likely due to historical differences, especially the effects of the frontier on U.S. history.

Finally, the article did not address the way to preserve the non-commercially valuable plants and animals. How do we preserve the whooping crane or yellow-fringed orchid.

The philosophy of the article seems to fit in with the currently popular idea of letting the free market determine economic and social policies. The application of this philosophy to real life has not provided much protection for farmers or industrial workers. It shouldn't be expected to do much toward protecting wildlife either.

A wildlife magazine should encourage citizen involvement in issues like wildlife conservation. This article tends to tell people that their involvement is not needed.

Michael Laird
Shawnee Mission, KS

Dear Mr. Laird:

You raise some valid questions, but you also miss the point. The article did not advocate commercialization of all wildlife, nor did it suggest that the free market should determine the distribution or proliferation or protection of

wildlife. It simply recognized that many species have thrived on commercialization, that dollars do indeed bear on our management priorities.

You needn't be dealing in meat and hides to take part in the marketing of wildlife. The whitetail deer and wild turkey are intensively managed here not because they deserve better treatment than the Harris sparrow, but because sportsmen are willing to pay to hunt them. These species are marketable.

Citizen involvement, Mr. Laird, is something we welcome — indeed solicit. We certainly do need your support to conserve our natural resources, whooping cranes as well as deer. But the involvement that counts is measurable. It's money. Those who wish markets out of the picture must be willing to fund the management now underwritten by markets. Maybe that's not the way you think things should operate, but that's the way they do.

Wayne van Zwoil

Editor:

I have one dissatisfaction with the Kansas Fish and Game Commission. I bought fishing licenses for the many years I lived in Kansas, and at age 65 none was required.

Four or five years later, we moved 15 miles into Oklahoma to live near relatives and our burial plot. One day I asked a Kansas game official if I could still fish in the state. He said I could, only with a nonresident license.

Why can't a long-time license buyer be issued a permit to fish when they happen to live in another state?

W.E. Bird
Alva, OK

Dear Mr. Bird:

Your contention is not unreasonable, however everyone must understand that

wildlife management is expensive and becoming more so each year. To ensure continued management of the state's fish and wildlife, the Kansas Fish and Game Commission must be run responsibly, with enough income to balance expenditures. Many people could point to good reasons why they should not have to purchase licenses, but the fact is that we must all be willing to pay, so this and future generations can enjoy wild Kansas the way we have. *Manes*

Editor:

I am an avid waterfowler and read with interest the notice in the March/April '85 issue of KANSAS WILDLIFE concerning the phase-in of steel shot requirements for the taking of waterfowl.

Even though low duck populations are more likely due to the northern prairie drought, the facts of waterfowl lead poisoning seem to have been well established for some time. I cannot quarrel with the idea of using steel shot if it will save more ducks from lead poisoning and will not increase crippling of the birds. However, in the March/April '85 issue of *Ducks Unlimited* magazine, the editorial by Dale Whitesell once again questions the wisdom of a steel shot requirement at this time.

If indeed we are on our way to taking waterfowl by steel shot only, I would appreciate your interpretation of the Interior Department ("hot-spot" recommendation). I would also appreciate your address of some important questions to those of us who prefer to load our own shot shells.

1. Do you expect the price of commercial steel shot loads to be competitive with lead?
2. Will the shot shell reloader be offered steel alternatives to lead?
3. Will steel reloads be allowed? If so, how will game wardens enforce the law?

Thank you for your attention to these questions.

Hanley Jackson
Manhattan, KS

Dear Mr. Jackson:

Lead is a biological toxin. Losses to

lead poisoning are substantial and may occur wherever lead shot is deposited. The Kansas Fish and Game Commission, as well as a great majority of professional conservation organizations, holds that the benefits of using non-toxic steel shot for waterfowling outweigh any disadvantages. Crippling is a function of the gunner, not the load. Crippling with both steel and lead will continue among hunters who fail to apprise themselves of the ballistic performance of the loads they are using.

While eliminating the use of lead in waterfowl hunting is the ultimate solution to lead poisoning, it is not realistic to expect this action immediately, particularly at a nationwide level. Problems such as lead shot inventories and steel shotshell supplies and distribution dictate that it be done gradually. The zoning or "hot spot" approach facilitates this transition. The Kansas Fish and Game Commission maintains that zoning should only be used temporarily in lieu of requiring non-toxic shot for all waterfowl hunting. While setting minimum criteria for zoning, the proposals advanced by the U.S. Fish and Wildlife Service do not prevent states from progressing beyond the hot spot approach, should they so desire.

In reference to your concerns about reloading steel:

1) Steel is cheaper than lead in bulk but much harder to manufacture into sized pellets. The cost of steel, relative to lead, should decline as research and development costs are recovered and its use becomes more widespread and stable.

2) Steel shot is already available for reloaders in sizes 6 through BB, and the new, next-larger size "T." Reloading components compatible with steel shot are available in 10 and 12 gauge. Steel reloads are legal for taking waterfowl in non-toxic shot zones.

3) The means by which law enforcement officers will check steel reloads will be the same as those now used to check factory shells. Research is being conducted on the feasibility of using chemical tests on shot wounds, as well.

Wayne van Zwoll

IN AGREEMENT

Dear Editor:

An article by Bill Layer in the May/June edition of KANSAS WILDLIFE, entitled "Changing Channels," describes the deterioration of the Black Vermillion River caused by channelization projects above Frankfort, Kansas.

To prevent their land from flooding, some landowners bulldozed ditches across their property, cutting off loops of the river. The purpose of this thoughtless, selfish, and possibly illegal project was to move the water through their fields faster. The result has been to wash away their own topsoil and increase flooding on the land downstream. In addition, this channelization work is making the Black Vermillion fill up with silt and is destroying wildlife habitat all the way down to the Big Blue River. What right does a man have to do something on his own property that physically damages the land of another and eliminates the enjoyment of what is common to all?

My own family lives close by the river and we fish there constantly. The river is something we all treasure as relaxation for ourselves and education for our children. We must protect it from abuse and senseless damage or our children will not have it to enjoy at all.

Jeremy Greenwood
Frankfort, KS

Editor:

The article, "Changing Channels," in KANSAS WILDLIFE is super! We in Missouri are having much the same frustrations as you.

Joseph P. Bachant
Missouri Dept. of Conservation

CREDIT DUE

A letter in the last issue of KANSAS WILDLIFE, regarding habitat losses resulting from road construction, should have been credited to Mary Winder of Troy, Kansas. *Manes*

PERSPECTIVE

Editor:

Cancel my subscription to your magazine, KANSAS GUNS AND KILLS. The last issue, full of guns, dead fish, killer dogs and — most especially a snake eating birds — was the last straw.

The picture story of the snake eating the young birds was horrid, sickening, wrenching, nauseating, repulsive, gross, thoughtless, and cruel. The shots were obviously set up ahead of time. What was the photographer doing watching those birds become prey? Was he more interested in getting a publishable shot than he was in preserving life? The thought that he

even induced the snake to raid the nest crossed my mind. Pictures like those are not accidents. If this was the case, then your magazine is guilty of encouraging your wild death photographers to play with their subjects. I find that revolting.

Diane Quantic
Derby, KS

Dear Ms. Quantic:

Mike Blair was recording the daily development of the young kingbirds on film. The snake happened along as he was working near the tree. The birds didn't *become* prey; they *were* prey. The snake was a predator. Mike was only an observer.

You've exhausted the dictionary to describe your reaction to a natural act that takes place millions of times each day in the wild. That it is unfamiliar to you makes it no less real. It is the way things work. Snakes eat birds, just as birds eat insects. Wild creatures don't get their meals wrapped in cellophane.

KANSAS WILDLIFE will continue to show life as it is in the wild and to address issues of importance to Kansas outdoorsmen. It is neither our duty nor our prerogative to depict nature as you would imagine it, Ms. Quantic. We revel in the beauty and vigor and diversity of wild creatures; we accept and try to understand the way they interact; we acknowledge that all can thrive under regulated use. The Kansas Fish and Game Commission is not in the business of protecting young birds from snakes. Its mandate is to pursue a conservation policy in the best interests of the wildlife resource and the people of Kansas.

My apologies for the dead fish — they cook better that way. Had you read the gun article, you would have found it an historical piece. Killer dogs? The care and training of puppies hardly merits such a title.

Your perspective is indeed interesting, Ms. Quantic; where on earth did you get it?

Wayne van Zwoll

WRONG

An editorial reply in the "Letters" portion of the July/August KANSAS WILDLIFE, wrongly stated that Kansas residents over 65 years old could trap furbearers without a license to do so.

Exemptions for the state's senior citizens apply only to hunting and fishing licenses. *Manes*

THE LAW

culprits paid \$375 and lost their fishing licenses. *Manes*

UNBELIEVABLE

A trapper from Evanston, Wyoming was fined a total of \$2,200 and sentenced to two and a half years in jail for killing a deer and a golden eagle and using the animals for bait on his trap line. After serving his jail time, the man will be on two year's probation, during which he will not be allowed to hunt, fish, or trap. *Manes*

BASS BUSTER BUST

Four Louisiana bass tournament anglers stood to make more than \$350,000 if their scheme worked. They brought some very large bass from Florida and claimed they were caught in Texas tournaments.

It might have worked, if it wasn't for U.S. Fish and Wildlife Service Special Agent Steve Hamilton whose investigation led to the crooked anglers and the fishy winnings. Federal judges took a dim view of the matter. For mail and wire fraud violations and interstate transportation of stolen money, the leader was sentenced to five years in prison and fined \$5,000. The other seven men involved also received heavy fines and were sentenced to federal prisons. *Manes*

KA-123?

Wildlife Conservation Officer Terry Cloutier watched from across the small lake, as three men loaded their boat onto its trailer. Near the ramp was a sign stating that the lake's water was and low and the ramp was not useable. When the three men got the boat secured on the trailer and started to pull away, they found the sign's message was true. The trailer tires were hanging off the end of the concrete ramp, and the pickup truck couldn't budge it.

Cloutier watched a little longer, as the driver of the truck pushed the accelerator to the floor, trying to free the boat and trailer. Then, like a shot, the sound of the ball hitch breaking loose from the truck's bumper rang across the water.

Cloutier drove around to assist the unfortunate trio. Then he noticed the registration numbers on the boat, "KA-123." Suspecting

there was something wrong in the registration, Cloutier asked to see the papers.

The owner had indeed registered the boat, but the number he had affixed to the side of the craft was one in an example from the instructions regarding the proper way to display the numbers. In addition, two stickers supposed to be attached to the sides of the bow were on the windshield and stern.

Next, Cloutier asked if they had a life jacket for each man on board. The owner produced two proper jackets, but the third looked to be a nylon day pack.

"Uhh, could you show me how this one works?" requested W.C.O. Cloutier.

Unzipping a pocket on the pack, the man removed a straw and inserted it in an opening near another zipper and started to puff air into it.

Containing his amusement, Cloutier issued the boat owner a citation for operating the boat without proper life jackets, and a warning for improperly displaying his registration. Then with the help of several other men and a new hitch, they freed the trailer and sent the three men on their way, leaving Cloutier to shake his head in wonder. *Manes*

OUT OF ORDER

"Here they come," hissed the Anderson County sheriff's deputy over Wildlife Conservation Officer Doug Sonntag's walkie-talkie. Sonntag was walking along a creek bank looking for the men he had been told were using a telephone magneto to shock fish.

By the time Sonntag got back, the deputy was holding the three men for questioning. The suspects had pulled their boat onto the bank, unloaded the magneto into a bucket, and covered it with some other equipment.

Casting a suspicious eye on the boat and pickup, Sonntag finally asked about the contents of the bucket.

One of the suspects quickly pushed his hand to the bottom of the bucket, and pulling out the magneto, replied, "Just this telephone."

Sonntag had already noted that the pile of equipment included no bait, and it appeared the fishing rods hadn't been used in some time. So, he issued them a ticket for possession of an illegal fishing device.

In court, the men told a judge the magneto didn't work, but he wasn't swayed. The three

CHECK STATION INFO

Kansas Conservation Officers have, for several years, set up roadside check stations during the opening weekend of pheasant season. The stations are operated in cooperation with Kansas Highway Patrolmen, who stop vehicles and direct hunters to Kansas wildlife conservation officers.

During the past four years, check stations have netted an annual average of 110 wildlife violations. The most common violation has been transporting a pheasant with no means of determining the bird's sex. The second most common one was possession of hen pheasants. Other violations frequently uncovered in the check stations involve improper hunting licenses, waterfowl regulations, exceeding the limit on pheasants, and game taken out of season. *Manes*

YOUTH REWARDED

Two thousand dollars is a large amount of cash, especially to a 10-year-old boy. Ritchie Lewis of Elon College, North Carolina received a \$2,000 check and heartfelt thanks from high-ranking officials of the U.S. Fish and Wildlife Service and the N. C. Wildlife Resources Commission for his part in the conviction of three wildlife vandals.

Last summer, Ritchie Lewis saw the men stabbing a threatened loggerhead sea turtle on Atlantic Beach. He quickly reported the incident to his father and a nearby pier operator, resulting in the conviction of the three men and the levying of the stiffest penalties ever paid for a wildlife case involving a threatened species in North Carolina. The young man also was eligible for a reward under the provisions of the federal Endangered Species Act.

"By doing the right thing, Ritchie has set a fine example for other young people throughout North Carolina and the nation," said Richard Jantzen, director of the U.S. Fish and Wildlife Service, as he presented the reward. "All too often you only hear negative things about young people, but Ritchie has shown that this is not necessarily the case. Ritchie's actions have also helped save one of the things that makes this such a great country — our rich natural diversity." *N.C. Wildlife Resources Commission*

ISSUES

OF WATTS AND WILDLIFE

The generation of electric power has made its indelible mark on modern times. Electricity is the most versatile form of energy, convertible to any other form. It is our non-human slave.

What has this to do with water, woods, and wildlife?

The generation of power by thermal or nuclear means is associated with many unpleasant environmental consequences — radiation, smoke, ash, waste heat, acid rain, habitat destruction, and others. It is easy to be “against” chemical or nuclear pollution — but it is better to be “for” alternatives and solutions. We as sportsmen need to be aware of these solutions and support them, for environmental decay is our own and wildlife’s worst enemy.

The era of cheap, abundant power will soon be over, but even at higher prices, electricity will still be reasonably priced and people will still buy plenty of it — and the environmental costs will continue to rise. Power company officials know their customers want the dependable “ready kilowatt” they’ve grown accustomed to. Consumers put reliability above almost all other considerations and often view environmental concerns as very low priorities in comparison.

During a recent trip to Southern California, I visited two “wind farms”, one east of Bakersfield, the other near Palm Springs. There, winds turn propeller-like blades which drive electrical generators. I saw hundreds of these windplants on the flats and ridgetops, producing their clean power.

Another even more interesting installation was the Arco Solar Photovoltaic array west of Bakersfield. Through the use of a silicon semi-conductor they produce electricity directly from sunlight — silently, with no moving parts.

Large amounts of power are produced by these panels, with no smoke, ash, or radiation. The panels attracted so little attention from the highway that I had to be careful not to miss my turnoff. Compare that to a three-stack coal-burner! A grade school was located within one mile of the array. There was no need to take precautions because of the nearby power plant.

Wind and solar generation are currently only part of the solution. With present efficiencies and costs, a 1000 megawatt photovoltaic plant

would cost \$10 billion and would cover over 40 square miles. Similar capacity from windplants would require 10,000 machines with blade diameters of 100 feet. The environmental impact of such large arrays of solar panels or windplants would be significant by the amount of space they would cover and their visibility. Of course they produce full power only when the sun shines or the wind blows, but the sun and wind are the ultimate renewable natural resources, abundant in Kansas and nearly everywhere in the U.S. The amount of power that can be produced by these methods is significant. The windplant’s generating capacity is several hundred million watts and even the solar panels produced six million watts at peak output.

These solutions are only partial for now, but we as sportsmen, not just citizens, need to let business, government, and our communities know that we’re for alternative energy and favor its development in Kansas. The utility companies can even be convinced, I hope, that the use of these safe, non-polluting technologies is in their best interest. This is a situation in which both people and wildlife can benefit, without either losing. But, like all conservation work, it will take information, motivation, and support to make the needed changes. *Dr. Thomas Pirotte*

IN THE WATER

No factories, feed lots, or farm fields — just a small city is all it takes to put potentially dangerous trace metals into the waters of nearby streams. The amount of these metals finding their way into creeks and rivers depends on many factors, including the size of the city and the amount of annual precipitation which falls.

A study conducted by the U.S. Geological Survey found concentrations of lead, zinc, sodium, and chloride in Shunganunga Creek, which has a drainage that encompasses Topeka, Kansas. Lead, says the three-year study, comes mostly from automobile exhaust and accumulates in urban road sediments. Zinc comes from galvanized metals, tires, and automobile brake linings. Salt applied to streets during winter is the source of sodium and chloride materials. All of these substances, carried in roadway runoff, find their way into storm sewers and ultimately into creeks and rivers around the nation’s cities. *Manes*

WISDOM TO THE WEST

One of the greatest disagreements over the future of streams in the U.S. centers around the actual value of creeks and rivers. In the past, when a project was studied to determine if it was beneficial, the only important consideration was whether or not the income generated was greater than the cost of the development. Because values as recreational areas, fish and wildlife habitat, and wild and scenic areas are difficult to measure, they have traditionally been left out of feasibility studies.

A recent study conducted by three Colorado State University economists, states that residents of that state would be willing to pay almost \$100 per household annually to protect certain streams. In a random sample of 214 families, participants identified four major reasons for wanting to protect the streams. None involved outright monetary values. Most important was “knowing that the rivers will be preserved in free-flowing form and will be available for future generations to enjoy.” Second in importance was “protection of fish and wildlife and habitat.” Third was “satisfaction in having options of future recreation on the rivers.” Fourth was “boating, fishing, camping, and hunting.” *Manes*

FIGHTING BACK

Sportsmen in 11 states are now protected by laws prohibiting their harassment by animal rights activists. Most of the measures are based on a model law promoted by the Wildlife Legislative Fund of America. In 1985, a total of 23 anti-harassment bills have been before 16 state legislatures.

Earlier this year, the Maryland and Connecticut legislatures passed anti-hunter harassment bills. Both measures await signatures by the Governors. If the bills are signed, Connecticut and Maryland will join Louisiana, Michigan, Maine, Nevada, Pennsylvania, Vermont, South Dakota, Illinois and Arizona as states that have passed anti-harassment legislation.

So far in 1985, 14 other states have seen introduction of these pro-sportsman bills. They are Massachusetts, Minnesota, Missouri, Oregon, Tennessee, Texas, West Virginia, Alaska, New Hampshire, New Jersey, New York, Oklahoma, Rhode Island, and Kansas.

Animal rights groups in some northeastern states have mounted campaigns of opposition to the anti-harassment bills. In most areas, legislators see the bills as good ways to head off tragedy and show support for hunting.

WLFA

HUNTING

SAFE BOWHUNTING

New archers should be aware of the specific safety considerations that apply when hunting with a bow and arrow. Most bowhunting accidents, for example, are self-inflicted, and many such injuries are the result of the careless handling of equipment, especially broadheads. To begin with, if you're unfamiliar with how to properly install or sharpen your broadheads, be sure to get some help from an experienced bowhunter or dealer who specializes in bowhunting equipment. Also be sure to select a quiver with a protective hood, and be careful never to leave exposed broadheads lying around. When you're out hunting, don't carry an arrow in a nocked position, especially when going through difficult terrain or crossing an obstacle.

A hunting arrow may travel at less than 200 feet per second, yet at close range it can penetrate better than a centerfire bullet. So be sure you have an adequate backstop, such as hay or excelsior, or a sandbank. In the field, always make sure that your target is clearly visible and that you know what lies in the area beyond it. A hunting arrow can be dangerous at distances of several hundred yards.

Broadheads aren't the only piece of equipment to which you should pay attention. Break and discard any arrows that have fractured or weakened, and regularly check your bowstring and bow limbs to be sure they're in top condition.

Every bowhunter should be familiar with the basics of treestand safety. When selecting a site, choose a tree you know will support your weight. A portable stand is the best choice today, as permanent stands can become dangerously weak after just a few years of outdoor exposure. Always secure yourself with a safety strap as soon as you get up in your stand. Once strapped in, use a line to haul up (and lower) your equipment.

As with any other type of hunting, common sense and good judgment are the keys to safe bowhunting. *N.S.S.F.*

STAFFORD CO. STEEL

Stafford County, Kansas will be one of many areas throughout the nation under observation by U.S. Fish and Wildlife Service

(FWS) special agents and state wildlife conservation officers during the fall waterfowl hunting season to help ensure that hunters use nontoxic (steel) shot.

The regulations banning lead shot for waterfowl hunting in Stafford County are intended to protect bald eagles from lead poisoning. Ducks and geese get lead poisoning from ingesting spent lead shot pellets they swallow while consuming seeds or grit. In turn, bald eagles sometimes feed on sick, crippled, and dead waterfowl, and may ingest lead shot contained in the bodies of those birds, resulting in their death.

Nontoxic shot has been required for waterfowl hunting in designated areas nationwide since 1976 to prevent lead poisoning in waterfowl. Additional nontoxic shot zones have been established this year to address the potential for eagle deaths from lead poisoning.

Stafford County has a waterfowl harvest of about 13,000 birds annually, and a bald eagle population of more than 50. *USFWS*

SANDHILL SEASON

In its July meeting, the Kansas Fish and Game Commission directed agency Game Division staff to examine possibilities for a 1986 sandhill crane season. The Central Flyway Council approved the crane season several years ago, and Fish and Game proposed one in 1982. It was opposed by some conservation groups and other individuals who finally defeated it.

Sandhill crane hunting has been shown to be biologically sound, and poses no threat to the species or other wildlife, but Fish and Game Commissioners want to wait until 1986 to begin the season in order to allow discussion with groups which oppose the hunt. The year's wait will also give the agency time to educate hunters about the new season. *Manes*

DEER DATA

The year was 1965. It was Kansas' first deer season, lasting five days for firearms hunters and 46 days for archers. Only 3,546 hunters went afield with rifles, and 1,151 with bows and arrows. The success rates — 14.2

percent for archers and 37.8 percent for firearms hunters.

Twenty deer seasons later, in 1984, almost 30,000 gun hunters and 13,000 archers went afield. The records show last year's hunters spent more time in the field, and it paid off with the highest success rates of all time — 31.4 percent for bowhunters and 68.0 percent for gun hunters. In 1965, the average was 2.9 and 7.4 days afield per hunter for firearms and archery hunters respectively, while 1984 hunters spent 3.5 and 18.3 days in pursuit of their game.

During the 1984 deer season, the highest harvests and concentrations of hunters were generally in eastern counties, but the highest success rates were in the west. Many western counties had success rates for archers over 40 percent and better than 80 percent for gunners.

The top two counties by total number of deer taken by firearms hunters were Chautauqua with 753, and Montgomery with 628. For archers the top two were Butler with 118 and Reno with 107.

What's in store for the 21st Kansas deer season?

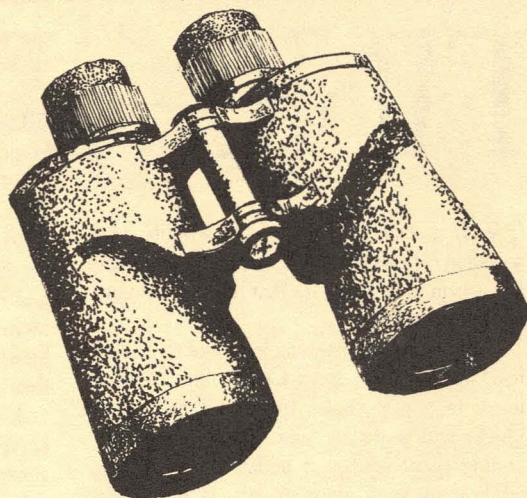
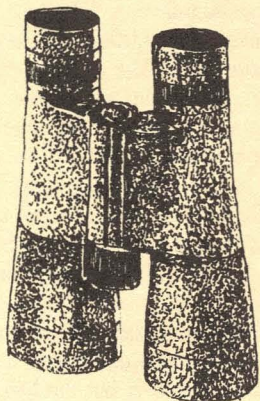
Deer management experts say there will be about 2,000 more deer harvested, and about 55 percent of the total will be does or antlerless. This is a reflection of the Kansas Fish and Game Commission's commitment to management of the herd for the best interests of landowners, as well as continued top quality hunting. *Manes*

THE STEEL TRUTH

A stubborn myth regarding steel shot is that it causes barrel separation in double barreled shotguns, scoring and erosion of barrels, and choke expansion, or ring bulge.

The fact is that steel shot will not damage the vast majority of modern American-made and foreign-made shotguns. The quality of earlier steel shot loads did not compare with those now available. Modifications in shotshell design have eliminated problems with barrel erosion and scoring by enclosing the entire shot charge in a new, stronger plastic cup.

Steel loads and magnum lead loads may cause ring bulge in some tightly choked shotguns. Either steel shot or lead shot also may cause barrel separation in some older American-made and foreign-made doubles with soft steel barrels. Ring bulge is almost always cosmetic and does not affect the performance or useable life of a shotgun. Hunters who are uncertain about the effects of steel shot on their shotguns should consult the manufacturers. Jay D. Hair, N.W.F.



BINOCULARS

No matter what your outdoor interests, you'll find the outdoors more interesting through a good pair of binoculars. Oddly enough, few people own good ones. If you want to buy a pair of top-quality binoculars, here's what to look for.

Lightweight mini-binoculars are the rage today, but, like featherweight rifles and backpack fishing rods, portability compromises function. Steer clear of the compacts. Really big binoculars, like the kind that used to be advertised as Navy surplus, are likewise a poor choice.

Binoculars come in two basic forms: roof prism and porro prism. The porro prism glasses are the kind we used to think of as regular binoculars and have the ocular lenses (eyepieces) offset from the objective lenses (the forward ends of the barrels). In that crook are the prisms that magnify and sharpen the subject. Roof prism glasses have straight barrels, with the ocular and objective lenses in line. The prisms are still there, but squeezed into a smaller space. There isn't much difference in weight between roof prism and porro prism binoculars of the same lens size and magnification.

Binoculars are designated by numbers, like 7x35. The 7 stands for magnification; that is, 7 power. The 35 is the diameter of each objective lens in millimeters. Dividing the second number by the first gives us something known as exit pupil; here it would be 5. Squaring that number to 25 gives us a value for relative brightness, or the binoculars' ability to focus with limited amounts of light.

The 7 in the example tells us these binoculars are good all-purpose glasses, easy to hold steady but powerful enough for bird watching or hunting. A pair of 9x binoculars is more powerful but hard to steady without a rest. They aren't as bright as a 7x pair either, given the same objective size. You see, besides

making a subject bigger, binoculars must also bring a lot of light to your eyes. That way you can pick up details in low light conditions. Light transmission is a function of magnification and objective diameter and is measured by relative brightness or exit pupil. An exit pupil of 5 gives you a brighter picture than an exit pupil of 4. The pupil of the human eye can't open wide enough to use the light from an exit pupil much larger than 7.

Magnification of 7 to 10 and objective diameters of 30 to 40 are best for most outdoor uses. The 7x35 is deservedly popular, as is the 8x40. For hunting pronghorns or watching warblers you might want a little more power.

Two focusing systems are used in binoculars. Center-focusing models have one adjustable barrel and one wheel between the barrels that adjusts them both. If you think about that, you'll see that you can get the perfect adjustment for each eye with such a system and focusing for various distances is fast. Individual-focus binoculars have no center wheel, just an adjustment for each barrel. They are fully as precise and a bit more dust-proof, but not as fast to adjust for distance.

Good binoculars cost a lot because the best optical glass is much more expensive than the cheap stuff that goes into most binoculars. If you use your binoculars a lot, you'll save yourself headaches and eyestrain by getting the best you can afford. The finest German binoculars sell for over \$1,300. If you spend much below \$300 for a new pair of binoculars at retail, you are getting an inferior product. On a positive note, binoculars generally carry a substantial markup, and it's not hard to find them at heavy discounts through mail-order outlets.

After you get a good pair of binoculars, take care of them! Keep them dust-free and dry, and wipe the lenses only with lens tissue and lens cleaning fluid. Keep your fingers and

petroleum oils away from the glass. Once in a while you can have your binoculars checked for proper collimation (barrel alignment), but the best models are precisely collimated when new and shouldn't require adjustment.

Wayne van Zwoll

MAKING THE RULES

If you've ever wondered how each year's Kansas waterfowl seasons and limits were developed, here's the inside story.

It all begins with the U.S. Fish and Wildlife Service in Washington, D.C. That agency gathers input from its own researchers, the flyway councils (made up of state wildlife agency directors and waterfowl experts), private conservation organizations, and individuals in formulating proposed season and limit frameworks. When the Service has developed its proposals, they are published in the *Federal Register*, and time is allowed for public comment. Public meetings are also held to allow formal comment on the proposed seasons and limits.

After considering all the input from various organizations and individuals, the Fish and Wildlife Service sends its final frameworks to all state wildlife agencies. There the commission or other governing body of each agency adopts the individual state seasons and limits, which must fall within the minimum and maximums of the federal season frameworks.

This process is, for the most part, completed in two parts — one for early migrants (doves, teal, snipe, rail, woodcock, and sandhill cranes) and one for late migrants (ducks and geese). The final frameworks for early migrants aren't sent to the states until late July or early August, and those for late migrants are finalized in late August. At the time of this writing, only those for early migrants were available.

The 1985 dove season will run from September 1 through October 30, with bag and possession limits being 15 and 30 respectively. Teal season will begin September 14 and end September 22, with a bag limit of four and eight in possession. Rails may be taken from September 14 through November 22, with 25 being both the bag and possession limit. Snipe season also will begin September 14, extending to December 29. The bag limit is eight, and the possession limit is 16. Woodcock may be hunted from October 1 through December 4, and the bag and possession limits are five and ten respectively.

Waterfowl hunters should note that shooting hours for all early migrants except teal, are from one-half hour before sunrise to sunset. For teal, shooting hours are from *sunrise* to sunset. *Manes*

FISHING

HYBRID TROPHY

The striped bass-white bass hybrid was developed in the middle 1960s, and first came to Kansas in 1977 with the cross breeding of the two species at a temporary hatchery facility near Wilson Reservoir. The first wipers stocked in the state included 9,500 fingerlings in Sebelius Reservoir and 160,000 fry in Marion Reservoir. They have since been released in Coldwater, Marion, Elk City, Pomona, Council Grove, Kirwin, Lovewell, and John Redmond reservoirs. Many smaller impoundments in the state have also been stocked with wipers, but experts say the two best wiper spots in Kansas are Keith Sebelius Reservoir and Coldwater City Lake.

To produce the hybrid fish, striped bass females and white bass males are injected with a hormone which stimulates development of sperm and eggs. In about two days after the injections, the eggs and sperm are stripped from the fish and mixed together for fertilization. After another two days, the eggs hatch in special containers and are ready to stock as fry when they are five days old. If fingerlings are needed, the fry are held for about 35 days in fertile water, where they feed on microscopic organisms.

This year, hatchery workers at Kansas Fish and Game's Pratt facility, used two large striped bass females and about a dozen white bass males in producing one-and-a-half million wiper fry. Other wipers for the state's waters are obtained from Virginia in trades for Kansas fish.

Gilbert Meis of Oakley, Kansas had never fished for wipers before the four-day trip he took with his son and son-in-law early last June. As is the customary method for catching wipers at Keith Sebelius Reservoir, the trio was trolling with crank baits. Meis was driving the boat when his hooks caught what he thought was a snag. Disgruntled, he told the other two anglers to reel in their lines, while he circled around to work his lure loose. When he approached the spot where he was snagged, the snag began to swim away, and Meis realized he was in for a fight.

"The reel was screaming," Meis remembers, "and I started getting low on line, so I told my son to drive the boat and stay with the fish.

We had to speed up just to keep up with him. The fish just stayed deep. I thought my arm was going to fall off before I got it into the boat."

By six o'clock that evening, Meis was having his trophy fish weighed on certified scales and witnessed by Wildlife Conservation Officer Wes Wikoff. After Fish and Game's standard state fish record investigation period, Meis' new mark was approved, topping the old one, set in 1984, by almost three pounds.

Kansas Fish and Game Commission Biologist Steve Price speculates that the new record wiper was part of the original 1977 stocking of the hybrids in Sebelius Reservoir. Price says spring and summer rises in the lake's water level in 1982 caused exceptional shad spawns, providing food for rapid growth in the wipers.

"It is likely that there are more that size in the lake," says Price of Meis' catch, "and probably some bigger ones too."

Fisheries experts from the Fish and Game Commission say they expect the wiper record to be broken again in the near future, as this species is still new to the state and has great growth potential. *Manes*

TAKING STOCK

Nearly 45 million sport fish were stocked in Kansas waters by the Fish and Game Commission during 1984. The fish were released in state lakes, federal reservoirs, and community lakes. Most numerous among those fish stocked last year (in descending order) were walleye, channel catfish, and largemouth bass. Other species released in Kansas waters included smallmouth bass, striped bass, bluegill, redear sunfish, crappie, flathead catfish, white bass, and white amur.

Fish and Game's Assistant Chief of Fisheries Jim Beam says there are several criteria used to determine what type of fish will be stocked in each of the state's waters. "Our field biologists consider the desires of anglers using each water, as well as biological needs of the fish populations, in developing stocking plans. Another factor is the availability of various sizes of certain sport fish."

Beam notes that the new Milford Fish Hatchery will offer improvements in the sizes

and numbers of fish available for stocking in Kansas waters. The result, he says, will be better fishing for the state's anglers.

The largest single fish stocking in a Kansas lake last year took place at Lovewell Reservoir, when 11,240,000 walleye fry were released. Beam points out that when small fish are stocked, it is necessary to stock large numbers of them to ensure that enough survive to harvestable size. When fingerling or larger fish are released, fewer are lost to predators, so the benefits to anglers are more direct.

Manes

CRAPPIE STUDIED

White crappie populations don't always fare well in small lakes. Slow growth and high mortality seem to be characteristic in many such impoundments. To better understand why, a study was begun several years ago, investigating crappie growth, survival, and food habits in state fishing lakes. Although all the results have not yet been analyzed, some interesting facts have been noted.

Crappie generally grow faster, live longer, and provide better fishing in lakes that have gizzard shad populations, but there are exceptions. Even when shad are absent, growth is usually above average in lakes that have dense populations of largemouth bass or walleye, or where a large portion of the adult crappie are harvested by anglers. Further, gizzard shad numbers may become so great that they inhibit crappie spawning. Where shad are too numerous, development of other sport fish populations also may be hindered. Biologists warn that sportsmen should not release shad in ponds or small lakes, as they may not fit into management plans and could harm the fisheries.

Tom Mosher

24-HR FISHING LICENSE

A new 24-hour fishing license made available through an act of the 1985 Kansas Legislature is good for both residents and nonresidents. The license sells for three dollars, including a one dollar hatchery fee. Kansas Fish and Game Commission officials say its main use will be for nonresidents and Kansas anglers who fish only once or twice a year. The license is available from Kansas Fish and Game and State Park Authority offices, as well as many sporting goods and bait dealers. One convenience provided by the new fishing license is that it can be pre-dated to take effect during any twenty-four-hour period after the purchase is made. *Manes*

NATURE

REPTILE ROUNDUP

Snake and lizard populations have been periodically monitored in southcentral Kansas during the past 20 years. Bethel College Biology Professor Dr. Dwight Platt is currently conducting a two-year study aimed at determining trends in snake and lizard populations in Harvey County, comparing their use of different habitat types.

A total of 541 snakes of nine species and 163 lizards of four species were captured during the two-month trapping period. One trapping site was in the Sand Prairie area of western Harvey County, and two were located in the eastern part of the county.

Dr. Platt has drawn some tentative conclusions after his first trapping season. He says yellow-bellied racer numbers are quite high, after about 20 years of reduced populations. Eastern and western hognose snake populations are very low, as they have continued to decline since the 1960s. Platt notes that the two hognose species are candidates for listing as "wildlife in need of conservation" and should continue to receive careful monitoring.

Lizard numbers appear to be low in eastern clay and loam soil areas of the county, compared to populations in western sandy areas.

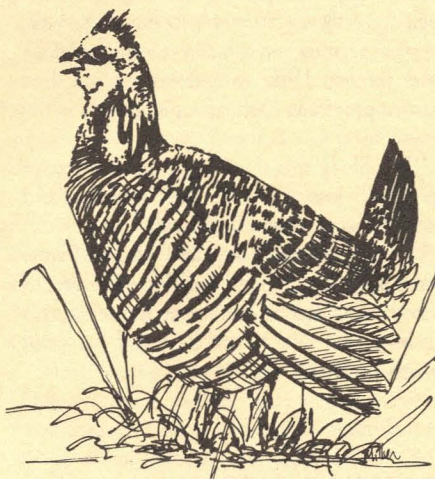
He also noted that snake numbers are generally lower in areas where the land is grazed or cultivated, when compared to undisturbed locations. His preliminary findings point to the importance of natural areas for the survival of certain reptile species. *Joe Schaefer*

FUNDING AVAILABLE

Financial support is available through the Kansas Nongame Program, to individuals and organizations, for research, habitat improvement, and education projects pertaining to nongame wildlife. Research projects should be designed to obtain information on population status, distribution, or requirements of nongame wildlife. Habitat improvement projects should be designed to provide essential requirements for nongame. Education projects should help to inform and educate the public about nongame wildlife and related recreational opportunities.

In the past, the annual budget for the Nongame Wildlife Improvement Program has

been approximately \$135,000. Of this, about 20 percent has been allocated to research, 15 percent to habitat improvement, and 10 percent to information and education projects. Proposals submitted by October 15, 1985 will be considered for funding in fiscal year 1988, which begins on July 1, 1987 (or earlier if funds are available). To receive a copy of the Guidelines for Nongame proposals, contact Marvin D. Schwillig, Kansas Fish and Game Commission, P.O. Box 1525, Emporia, KS 66801, 316-342-0658. *Joe Schaefer*



SAD STORY

The 1985 survey of lesser prairie chicken dancing, or mating, grounds tells a somber story. As reported by Small Game Specialist Roger Wells, spring densities of lesser prairie chickens were not significantly lower than last year's but 42 percent below the five- and ten-year averages.

Due to the encroachment of irrigation, the Kearny County survey route, which takes in 20 square miles, no longer offers any prairie habitat. The area has only one remaining dancing ground, and the number of birds using it is about one-half of those present just last year.

"At one time," states Wells in the report, "the Kearny County route had six gobbling grounds and an estimated 460 birds. Now there is one ground and about 16 birds in the entire 20 square miles."

"We will continue to monitor the demise of this population," resigns Wells. *Manes*

FALL FLORA

Though September and October usher in fall, a time of turning leaves and browning prairie plants, some of the grassland flora are still splashing color onto the landscape. Many wild plants, including the cardinal flower, bottle gentain, button snakeroot, downy gentain, and white lettuce, are just coming into full bloom as September fades into October.

Manes

MARTIN WATCH

Many Americans admire the purple martin, and research biologists hope those admirers, or anyone who has the opportunity, will help them learn more about the life history of this member of the swallow family. Purple martins winter in South America and spend summers as far north as Alberta Province in Canada.

Anyone who finds a dead martin is asked to remove the bird's wings at the body and mail them immediately to a federal collection center at Bird Banding Laboratory, Laurel, Maryland 50708, attention: wing sample. The envelope should also contain the cooperating citizen's name, address, and daytime telephone number, as well as the date and location the bird was found, cause of the bird's death if known, and federal permit number PRT-675458.

The collections are part of a study conducted by a cooperative team of U.S. and Brazilian wildlife researchers. The scientists spray-marked almost 170,000 purple martins at five large roosts in Brazil, using harmless fluorescent material. Based upon the wings that are returned, the scientists plan to determine migration patterns of the long-ranging birds. Martins disperse from Brazil in February and March to breed in the U.S. and Canada.

Purple martins are abundant in their range today, because of the introduction of martin houses. The houses are used in most areas of the country by people who like to have the birds in their yards. They are valuable consumers of mosquitoes and other insects. The nesting structures have helped martins to overcome competition from more aggressive species for natural nesting sites, such as tree cavities.

The purple martin project is sponsored by Dalgas Frisch of the Brazilian Association for Preservation of Wildlife, the Nature Society, and the U.S. Fish and Wildlife Service. More information may be obtained from the Denver Wildlife Research Center, Building 16, Federal Center, Denver Colorado 80225. *USFWS*

HORNED RABBITS

It is not uncommon to encounter cottontail rabbits with horn-like structures protruding from the top of their heads or near their mouths. These growths are not horns or antlers, but tumors caused by a virus. The condition, known as fibromatosis, is much like warts. The fibroma virus is transmitted by mosquitos.

Manes

IT'S A MOUSE!

Mice have been causing screams of terror since they first set foot in the homes of humans, and to most people a mouse is a mouse — but there are 13 species in Kansas, and most have little interest in living indoors. They are generally shy, nocturnal animals that offer little trouble to people.

ORD'S KANGAROO RAT



The Ord's kangaroo rat, actually a mouse, is distinguished by its long tufted tail and huge hind feet. Its front feet and legs are much smaller and often carried in a folded position. Like the pocket mice, the Ord's kangaroo rat carries seeds in its cheek pouches to underground burrows, where it makes large caches.

The plains pocket mouse is found mostly in the western half of Kansas, inhabiting dry sandy areas where vegetation is sparse. They have one or two spring litters in underground nests, and remain active throughout the year, except during short periods of extreme cold. They are not often seen even in ideal habitat.

The silky pocket mouse also lives in arid areas of western Kansas, preferring lands with good stands of prairie grasses. It makes tunnels near the bases of weeds, keeping the entrance plugged during the day and other periods of inactivity. These mice usually husk seeds before eating them.

The hispid pocket mouse is found across most of the state in open prairies. The hispid pocket mouse eats insects in spring, as well as the more usual mouse diet of seeds and other plant parts. Its fur is coarse, in comparison to

that of other mice, and the soles of its hind feet are hairless.

The plains harvest mouse is small and delicate. Found across Kansas, it seeks cover in good short-grass prairie or in rocky areas, and sometimes uses old bird nests in shrubs and trees to raise its young. It has a short tail and dark strip down its back. The plains harvest mouse has a lifespan of less than one year.

The western harvest mouse is also found across the state, preferring areas of dense tallgrass or mid-grass prairie. Like other harvest mice, they may huddle together during winter in nests lined with thistle down.

The deer mouse is the most common of Kansas mice, and believed to be the most abundant mammal in the state. They inhabit both woodlands and grasslands and raise young throughout the year. They are known to communicate by making vocal noises and stomping their feet, as well as by scents. They eat nuts, fruits, and insects. Most deer mice born in the field die after only a few weeks or months, but they can live for about eight years in captivity. They are prey for nearly every predator in Kansas.

As its name implies, the white-footed mouse has light colored feet and under parts, which contrast with the dark upper. It too is common across Kansas, depending on areas with stands of mature trees, especially along streams in western regions of the state. It generally moves in a lope or by jumping, with its tail held high.

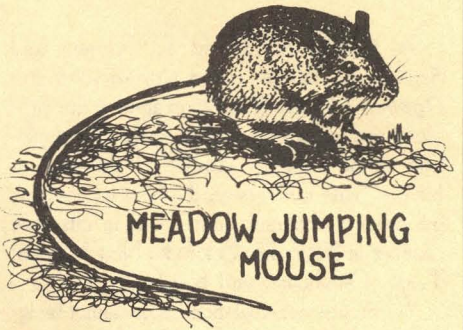
The Texas mouse is found only in southern extremes of Kansas. Its long tail is light colored underneath and darker brown on top, and its buff colored belly is peppered with darker guard hairs. It uses its tail to balance as it moves carefully along rugged rock outcrops and cliffs, where it lives. Acorns are its main food.



NORTHERN GRASSHOPPER MOUSE

Found across the western two-thirds of the state, the northern grasshopper mouse prefers dry, sandy areas. They are uncommon and seldom seen. Once mated, pairs of grasshopper mice are not tolerant of other mice. They communicate with barks and high-pitched howls. Unlike most other mice, they are generally predators, with about 90 percent of

their diet consisting of animals, including insects and other invertebrates. The northern grasshopper mouse also preys upon other small rodents, using its large claws to grasp its prey while it kills the prey by biting with long teeth at the base of the neck.



MEADOW JUMPING MOUSE

The adult meadow jumping mouse has a very long tail, which is dark brown above and a light yellow below, with a black tip. It occurs only in the eastern third of Kansas, where it prefers moist meadows near trees and shrubs. Meadow jumping mice are good swimmers and good climbers, often venturing up tall plant stalks in search of food. They are extremely wary, and flee with bursts of erratic jumps when frightened. They build up fat during the early fall and hibernate for about six or seven months of the year, with their tails wrapped about their bodies in burrows.

The house mouse may be responsible for much of the bad reputation endured by other mice. It was introduced to Kansas from Central Asia, and often moves into human dwellings during the cold months, making it a pest. House mice are often kept for pets and can live for six years in captivity, though they generally survive for only about a year in the wild. One key for identifying the house mouse is its naked, scaly tail. They can breed in just four weeks after they are born and do so year around. The house mouse has benefited humans by its extensive use in research, but also causes great losses in stored grains and other food. (source: *Mammals in Kansas*)

WISDOM

"O prairie mother, I am one of your boys. I have loved the prairie as a man with a heart shot full of pain over love."

Carl Sandburg

NOTES

OGALLALA BOOKLET

A booklet by David E. Kromm and Stephen E. White, called *Conserving the Ogallala: What Next?*, examines the problems and social attitudes surrounding the depletion of the Ogallala Aquifer. Published by Kansas State University, the booklet contains information obtained from irrigation intensive counties in Nebraska, Colorado, New Mexico, Texas, Oklahoma, and Kansas.

"Groundwater depletion issues cannot be ignored and must be addressed by leaders at the local, state, and federal levels," states Kromm in the publication. "We hope that the information on public preferences provided in this report can help leaders in the selection of effective and publicly acceptable groundwater management policies."

The booklet is available free of charge from the Kansas State University Department of Geography, Manhattan, Kansas 66506.
Manes

FIFTY CENTS MORE

Just about every kind of license and permit sold by the Kansas Fish and Game Commission costs fifty cents more than it did last year at agency offices. The Kansas Legislature passed a law requiring Fish and Game to collect the service charge on everything from fishing licenses to field trial permits and duplicate licenses to big game permits.

The new law allows all license vendors, public or private, to collect a maximum service charge of fifty cents. Though it technically doesn't constitute an increase in license fees, sportsmen still will pay the extra amount. It is especially important where deer, antelope, and turkey permits are concerned. All permit application fees must include the fifty cent service charge. Only certain registration fees, such as those for boats, will be unaffected. *Manes*

A WINNER

Scott A. Karnes of Studly, Kansas has won a Merit Award in the 1985 National Hunting and Fishing Day Poster Contest. His poster illustrating the contest theme "Why Wildlife

Needs America's Sportsmen" had already been selected as a winner in a local contest before being entered in the national contest. Scott, a sixth grader, will receive a \$50 U.S. Savings Bond for his winning entry.

His poster was one of thousands entered by students in local NHF Day Poster Contests sponsored by schools, youth groups, sportsmen's clubs, and civic and conservation organizations across the country. In addition to prizes awarded in local contests, there were 67 national awards totaling over \$6,000 in U.S. Savings Bonds.

The purpose of the National Hunting and Fishing Day contest is to encourage students to learn more about conservation and to foster an increased awareness of the role that sportsmen play in this country's conservation efforts. The contest is open to all students in grades five through twelve. NHFD

WILDTRUST IN CHINA

When Kansas House Speaker Mike Hayden recently traveled to Henan Province in the Peoples Republic of China, he presented government leaders there with a painting, done for the Kansas Fish and Game Commission's Wildtrust program. The painting of wild turkeys, titled "Walking Through Blades of Gold," was donated by Tom Crain to establish a memorial trust in the name of Clem Gillespie, a long-time Fish and Game employee who supervised the state's first turkey re-introduction projects.

House Speaker Hayden was part of a legislative delegation with the mission of improving trade relations and educational exchanges with Henan Province. Hayden says the Chinese province is similar to Kansas in latitude and agricultural production.

The exchange of gifts with the Chinese is a tradition, according to Hayden, and the painting of wild turkeys in their native Kansas habitat was one of the most praised gifts he had seen given in the exchanges. It will hang in Henan Governor He's office.

Hayden, whose college background is in wildlife management, says the Chinese are more aware of environmental concerns than he expected. "I found, to my surprise, that despite their great population density, they have under-

taken some impressive conservation projects," he remarked.

Chinese government officials told Hayden that, though their culture has existed for many centuries, ecological studies have been overlooked. They have recently realized the value of maintaining the quality of their natural surroundings. *Manes*

IT'S PROMISING

Small Game Specialist Randy Rodgers has earned the respect of many of his peers in wildlife management. His studies on the uses of undercutting tillage have provided important information about saving nests of doves, pheasants and many other species. Last October, Rodgers was invited to Washington D.C. by the U.S. Office of Technology Assessment to provide input regarding wildlife benefits in the 1985 Farm Bill.

Rodgers was one of 15 conservationists who commented on the nation's farm legislation. Included in the exchange were comments on the so-called "sodbuster bill." He says one of the most important aspects of the meeting was the opportunity for wildlife professionals to comment on the proposed Conservation Reserve Program, which would provide payments to landowners who remove highly erodible acreages from crop production permanently or for long periods. Proper management of these areas could result in 20 million acres nationwide, and more than a million acres in Kansas, which would provide important permanent wildlife habitat. Rogers notes that the Reagan Administration has already endorsed the program.

"It remains to be seen whether our comments will ultimately be incorporated into the farm legislation," says Rodgers, "but it's promising that Congress has taken an interest in wildlife conservation in farming matters. This is one of the few times when this has happened, and it is encouraging." *Manes*

KANSAS COOKBOOK

Kansas Wildlife Chef is a cookbook written by and especially for Kansans. It contains more than 100 original recipes for native Kansas game and fish — everything from deer and antelope to snapping turtle and prairie chicken. Complete with detailed illustrations, the book is available in bookstores or by mail for \$9.50. Send mail orders, plus \$1.25 for postage and handling, to *Kansas Wildlife Chef*, Box 414, Kirwin, Kansas 67644. *Manes*

NATURE'S NOTEBOOK

by Joyce Harmon Depenbusch
Wildlife Education Coordinator
Kansas Fish and Game Commission

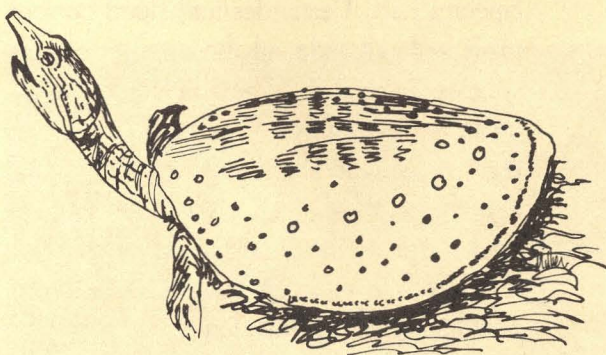
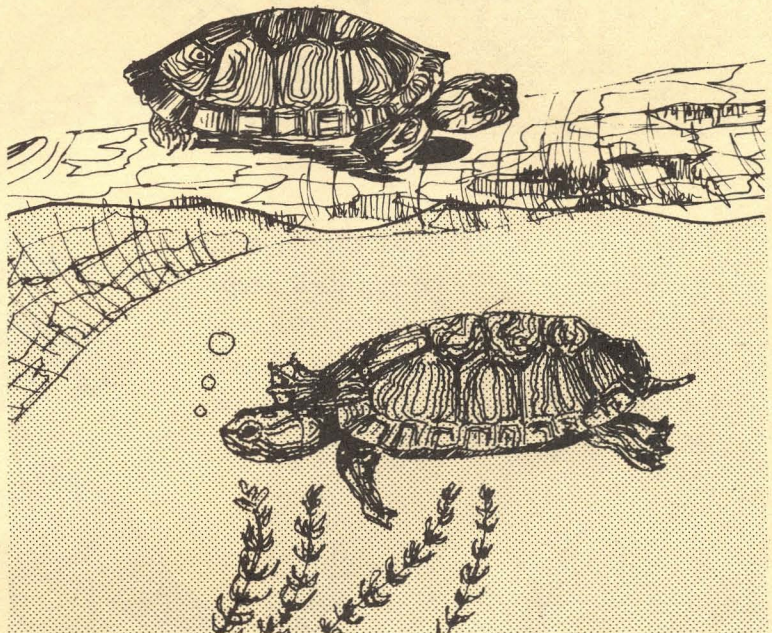
HAVE SHELL, WILL TRAVEL

When it comes to moving, U-Haul can take some lessons from turtles. Turtles carry their houses with them. They are made of an upper shell, or **carapace**, and a lower shell, or **plastron**.

What else makes turtles so unique?

Read on, and share what you know with a friend. The words in bold type are vocabulary words.

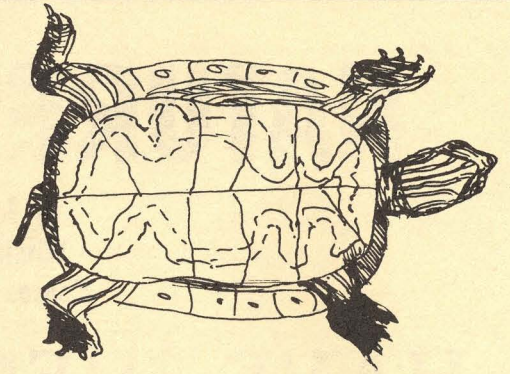
There are 222 kinds of turtles worldwide. Fourteen of these **species**, or kinds, are found in Kansas. Turtles are **reptiles**, as are snakes, lizards, and crocodiles. They are **cold-blooded**, which means their body temperature changes to match the surrounding air or water temperature. They breathe with lungs, forcing air in when they swallow. They also have air chambers, that work like gills for breathing during hibernation. Some kinds of turtles enjoy basking in the sun on top of rocks or logs in a pond.



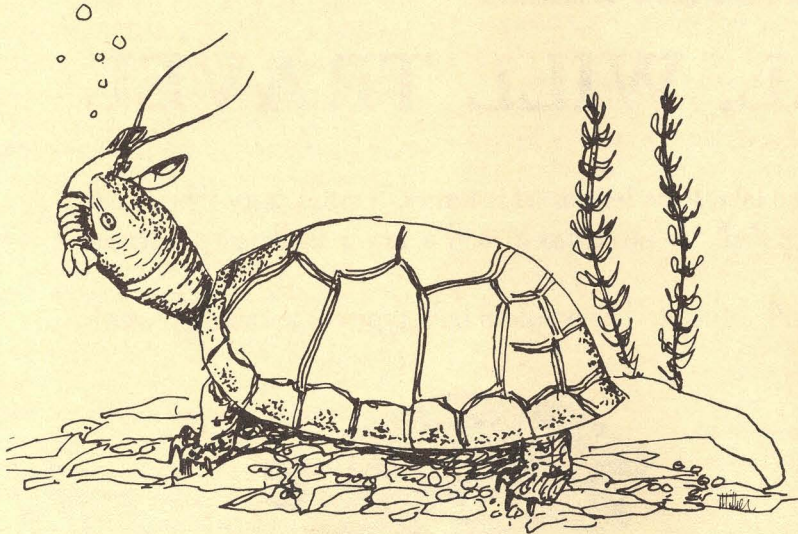
Turtles' moveable parts are limited to the head, neck, legs, and tail. The neck is very flexible, especially in soft-shelled turtles, because they have about eight **vertebrae**, or bones in their long necks. Turtles have three-chambered hearts.

Like birds, some turtles migrate. Green turtles migrate 1,400 miles from feeding to breeding grounds.

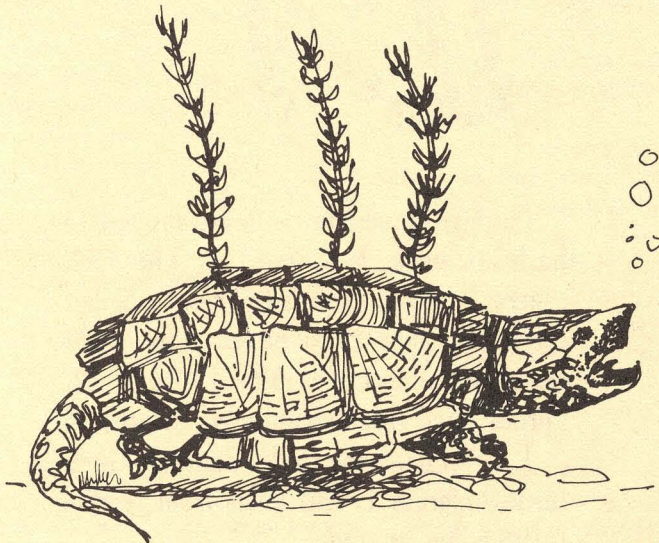
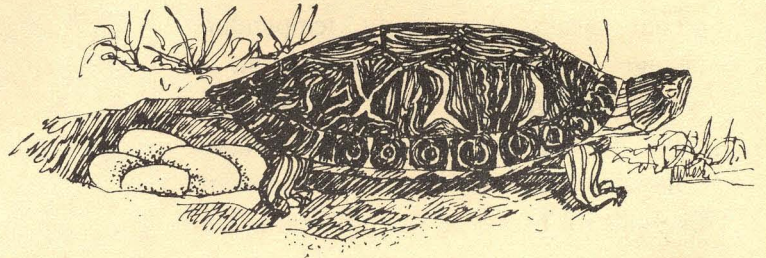
The feet of marine turtles are like broad flippers, while other non-marine **species** have broad, webbed feet with nails, or claws. Turtles have thicker skulls than other reptiles and very small brains.



Depending on the kind of turtle, it may be, **carnivorous** (meat-eater), **herbivorous** (plant-eater), or **omnivorous** (eats both plants and animals). They don't have teeth, but their jaws have sharp edges for cutting. Insects, tadpoles, fish, snails, crayfish, frogs, salamanders, and worms are among the animals eaten by carnivorous turtles. This yellow mud turtle uses its sense of underwater smell to find its dinner.



All Kansas turtles lay their eggs on land, in sand or soft soil. The egg shell keeps the growing turtle from getting too dry. From two to fifty eggs are layed in each **clutch** . The young of most turtles look for water after hatching.

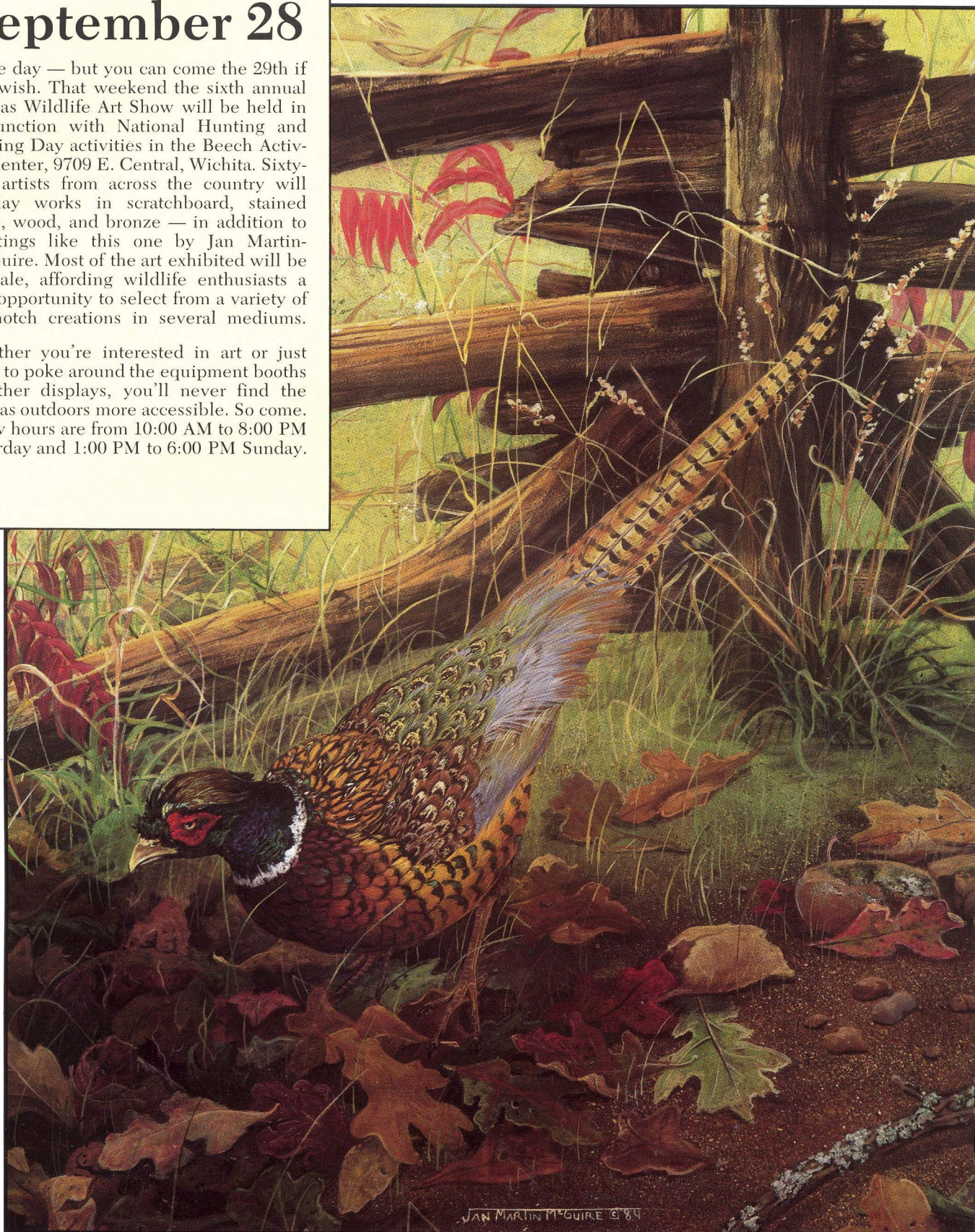


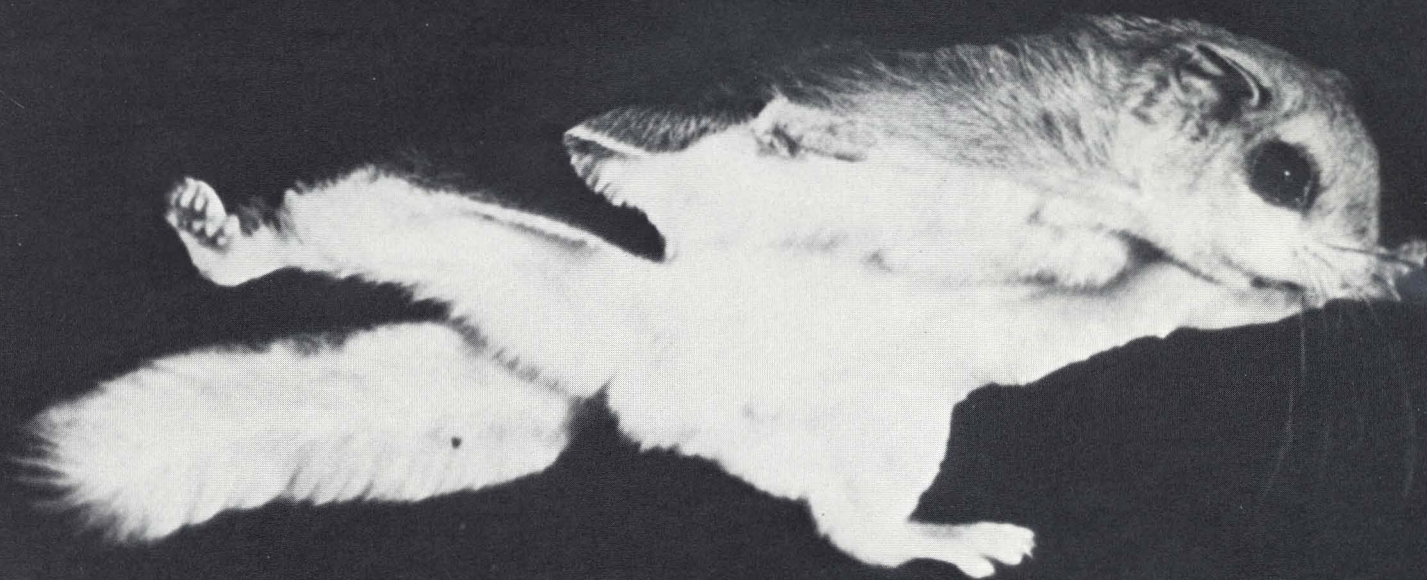
In 1978, the alligator snapping turtle was added to the Kansas Threatened Species List. Pesticides and flood control projects have reduced the number of this species in the state. The alligator snapping turtle is the largest Kansas species. It can reach a weight of over 230 pounds and a shell length of 32 inches. The leather-back turtle is the world's largest. It lives in warm seas and can grow to be a ton in weight and eight feet long!

September 28

is the day — but you can come the 29th if you wish. That weekend the sixth annual Kansas Wildlife Art Show will be held in conjunction with National Hunting and Fishing Day activities in the Beech Activity Center, 9709 E. Central, Wichita. Sixty-five artists from across the country will display works in scratchboard, stained glass, wood, and bronze — in addition to paintings like this one by Jan Martin-McGuire. Most of the art exhibited will be for sale, affording wildlife enthusiasts a rare opportunity to select from a variety of top-notch creations in several mediums.

Whether you're interested in art or just want to poke around the equipment booths or other displays, you'll never find the Kansas outdoors more accessible. So come. Show hours are from 10:00 AM to 8:00 PM Saturday and 1:00 PM to 6:00 PM Sunday.





SUPERSQUIRREL

Hollow trees are where most flying squirrels live. These animals don't hibernate, but as many as 20 may den for the winter in one tree!

This nocturnal acrobat is a common Kansas native. How many have you seen?

David Case

*black and white photos: Leonard Lee Rue III
color insets: Nancy M. Gosling*



From a perch high in the top of an elm, he launches into the darkness. The stretched patagium serves as an airfoil, allowing him to glide effortlessly, Superman-style. His path is full of tree branches, but this part of the forest is familiar, and he deftly dodges from side to side, using his flattened tail as a rudder. He gradually loses altitude, makes a ninety-degree turn around a tree, and swoops toward the forest floor. Just before reaching the ground he pulls into a sharp, upward arc, thrusting his feet forward. The patagium billows, acting as a parachute and slowing his descent. Delicate claws grasp the bark at the base of another tree as touchdown is completed. Contracting the patagium against his body, he scampers up the tree to launch into another glide.

A flying squirrel flitting through the air is a sight people might expect in a tropical rain forest. But these fascinating creatures are found in Kansas, too. Our state is host to one of two kinds of North American flying squirrels. The northern flying squirrel occurs throughout Canada, Alaska, and the upper tiers of states, while the southern flying squirrel occupies deciduous forest areas from New England south to Florida and west to the Rocky Mountains. It is also the species that inhabits Kansas.

Flying squirrels do not actually fly like bats or birds, but are quite well adapted to their gliding form of locomotion. Nancy Gosling, author of the book *Flying Squirrels; Gliders of the Dark*, described their flight as "a combination of the swaying descent of a falling leaf and the floating glide of a butterfly." Glides vary in length from a few feet to 100 yards. By gliding, then climbing a tree and gliding again, the flying squirrel can travel a quarter of a mile through the forest in a matter of seconds.

Flying squirrels apparently have certain paths or flight lanes they travel at night, much like deer have trails. Using familiar routes decreases the squirrels' chances of colliding with unseen obstacles. Before leaping on an unfamiliar path, flying squirrels bob their heads up and down and from side to side, apparently to determine the distance to their landing spot and obstacles in their path.

Unlike the other tree-dwelling squirrels in Kansas, the fox and gray, flying squirrels are strictly nocturnal. The retina in their eyes is composed entirely of light-sensitive rods and lacks the color-sensitive cones. In other words, flying squirrels see only in black and white. This makes for excellent night vision, but puts them at a disadvantage during daylight hours. Flying squirrels disturbed during the day often appear disoriented and have to squint to see.

Flying squirrels, or "fairy diddles" as the early settlers called them, feed mainly on nuts and seeds, but will also consume mushrooms, flowers, berries, tree buds, insects, and even an occasional mouse or bird egg.

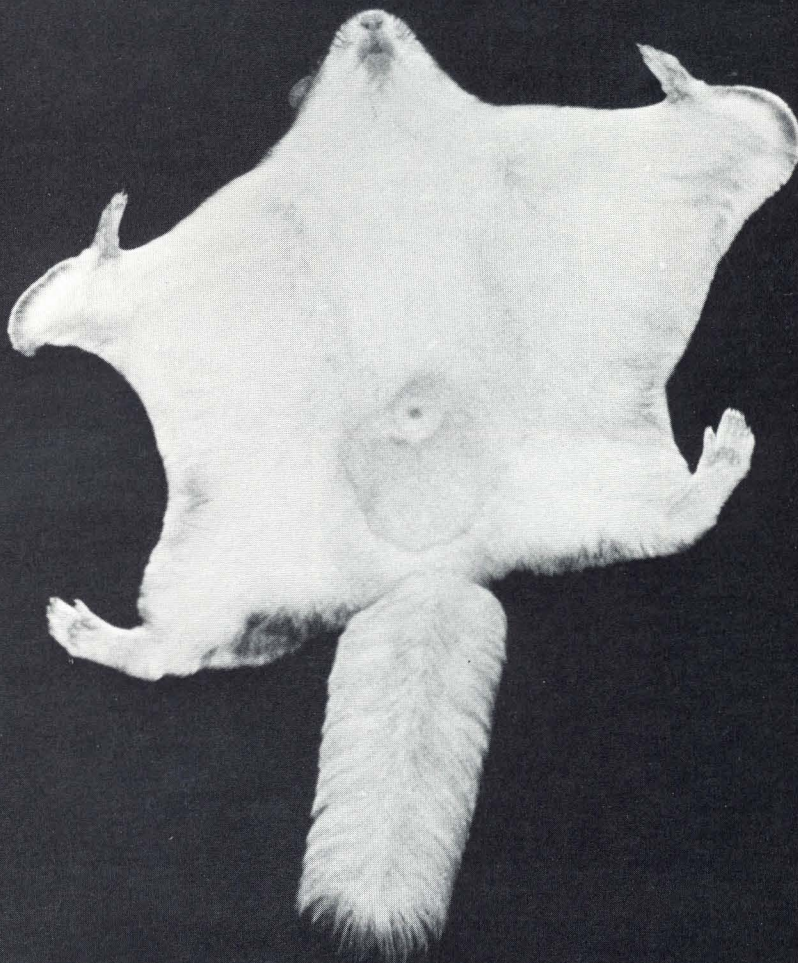
The southern flying squirrel may have two litters of young in a single year, depending on the age of the female and the availability of food and nesting sites. Flying squirrels, like a variety of birds and mammals, use holes in trees for raising their young. These dens are also important for protection from winter weather. Flying squirrels do not hibernate, but up to 20 individuals may huddle together in den trees during cold spells.

The first litter of flying squirrels is born in April and the second in August or September. The young, usually two to six in number, are blind and hairless at birth. The female flying squirrel is a devoted and capable parent, though, raising her family without assistance from the male. Females establish terri-

tories that they defend against invasion by other flying squirrels. When disturbed or removed from the nest, young flying squirrels emit a high-pitched distress squeal. The female will climb the pant leg of a person holding a young squirrel and search in every fold of clothing until she finds it. She will then grasp it by the belly and glide off to return it to the safety of the nest.

At six to eight weeks of age, the young make their first hesitant attempts at gliding. The family group may stay together for three months, but the juveniles will eventually leave or be chased off by the female as she prepares to raise

Flying squirrels are strictly nocturnal, and you won't see them perched on stumps during the daytime. A flashlight can be used to spot their eyes at night.

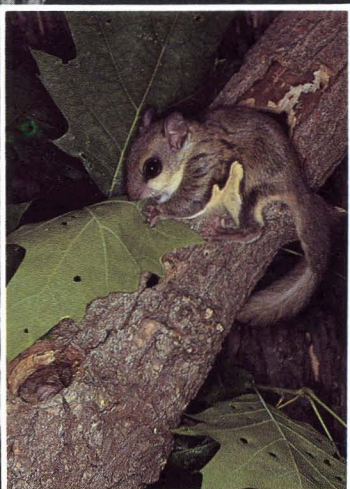




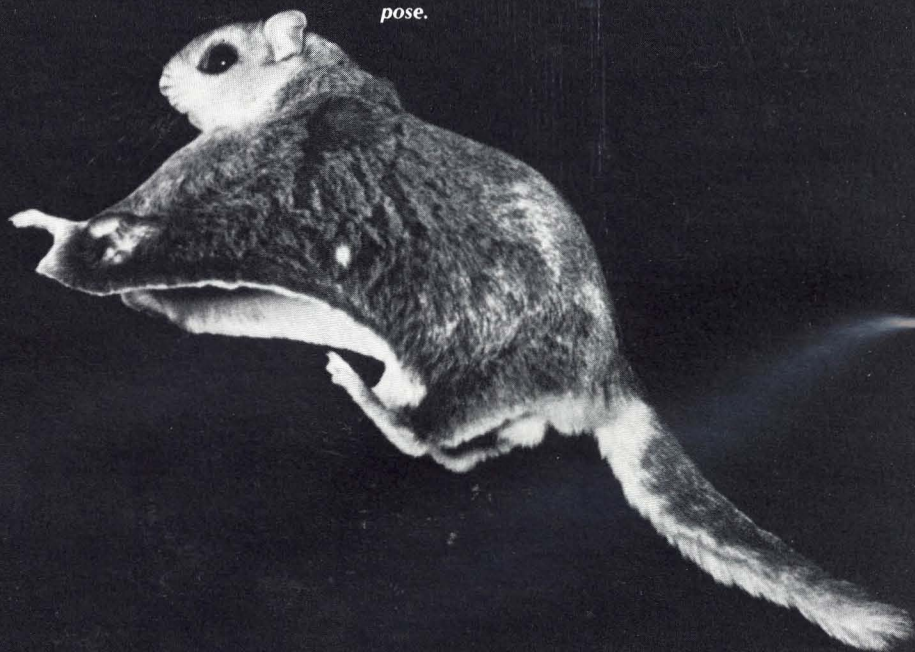
Flying squirrels are very protective of their young, which are born blind and hairless.



Like their cousins the gray and fox squirrels, flying squirrels relish mast and eat their meals in this familiar pose.



Small and delicate, flying squirrels were called fairy diddles by Kansas settlers who probably saw very few of them.





Leaves, berries, mushrooms, insects — even an occasional mouse or bird egg — all are food for the omnivorous flying squirrel.

another litter. Squirrels born in September will usually spend the winter with their mother.

Not much information exists concerning the distribution of flying squirrels in Kansas. They have been documented in Sedgwick County in southcentral Kansas, Cherokee and Crawford Counties in southeast Kansas, and Doniphan, Wyandotte, Douglas, and Shawnee Counties in northeast Kansas. Dr. Jerry Choate, Professor of Zoology at Hays State University, thinks flying squirrels occur throughout the forested eastern half of Kansas. But he says because the animals are nocturnal and secretive by

nature, they are rarely encountered by humans.

Flying squirrels are not limited to remote areas and readily adapt to the presence of people. Populations of the southern flying squirrel exist within the city limits of Houghton and Detroit, Michigan and Washington, D.C.

Joe Werner, urban wildlife biologist for the Missouri Department of Conservation, has received reports of flying squirrels in the older, parklike residential areas of Kansas City, Missouri. He added that some of these calls were from residents who reported flying squirrels taking up housekeeping in their attics. Terri Shuman, urban wildlife biologist for the Kansas Fish and Game Commission, says that although she has not had reports of flying squirrels in the Kansas City metro area, she is confident they occur there.

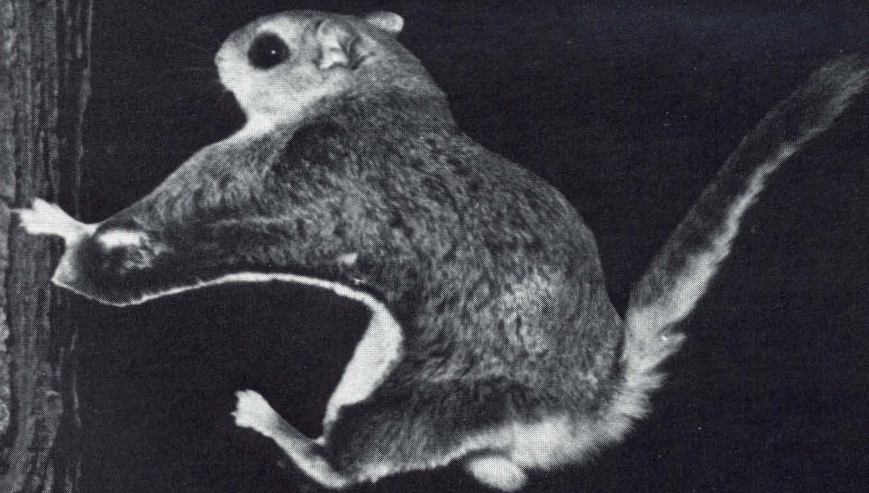
How do you find out if flying squirrels inhabit your neighborhood? If you live in a heavily wooded area, one clue might be the mysterious disappearance of bird food from your feeders during the night. Flying squirrels are fond of the seeds commonly put in bird feeders and may visit them on a regular basis. Once flying squirrels become accustomed to eating at a feeder, they will tolerate a dim light and will even glide up to the feeder with humans standing next to it.

The large eyes that aid flying squirrels at night make it easy for folks armed with a strong flashlight to spot them. When a light hits those eyes they will glow a brilliant orange. I first "shined" flying squirrels in southern Indiana; I was amazed to discover I could spot them in the tops of 60-foot oak trees!

Another way to locate flying squirrels is to find trees with old woodpecker holes or other cavities. Knocking on the base of a tree with a stick will often cause the inhabitant to poke its head out or even leave the cavity.

Flying squirrels will use artificial nest boxes placed in trees. Nancy Gosling suggests wooden boxes with inside dimensions of 4 x 5 x 10 inches and an entrance hole 1¼ inches across. The boxes should be placed 10 to 12 feet off the ground or as high as possible. Boxes designed for screech owls work well.

If you're lucky enough to have flying squirrels around your home or in your woodlot, call or write Marvin Schwilling, Nongame Project Leader, Kansas Fish and Game Commission, Box 1525, Emporia, KS 66801 (316) 342-0658. This information will help KF&G biologists document the range of flying squirrels in the state. It will also add to our small store of knowledge about this mysterious mammal, this Clark Kent of the forest that unfurls its cape after dark. □



Slot Length Limits

... an overview

In 1977, six Kansas state fishing lakes and one lake in Missouri became the first public waters in the country to be managed with a largemouth bass length limit other than a minimum length limit. The new approach to restricting largemouth bass harvest was initially viewed with skepticism among fishery professionals and the public alike. Today, though, the term "slot length limit" is a commonplace discussion topic among biologists and anglers nationwide, and its application has spread to species other than largemouth bass.

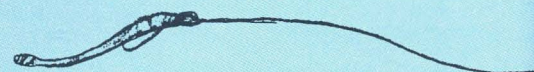
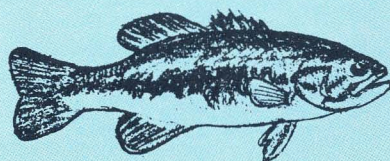
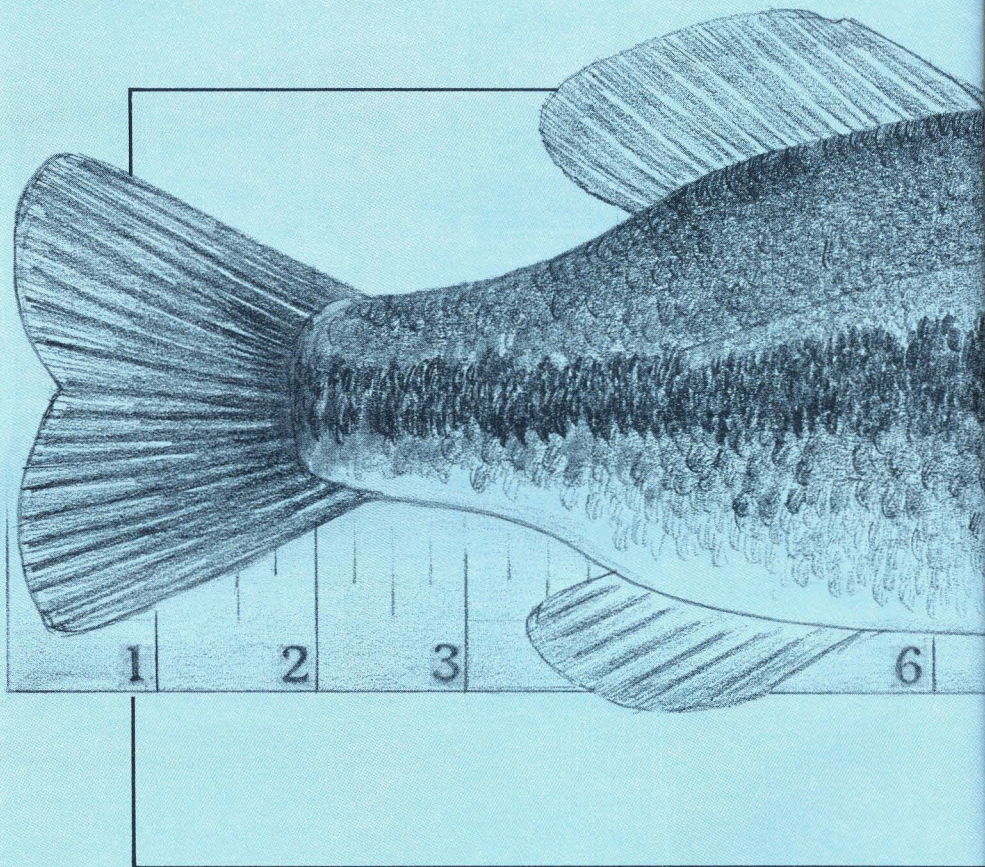
How did this type of harvest restriction come to be? What was it supposed to do? What did the Kansas Fish and Game Commission learn about slot length limits, and what might the future hold with respect to length limits?

Historical Perspective

Decades ago, minimum length limits of 10 inches or less were often imposed on largemouth bass. The intention was to postpone harvest of largemouth bass until after the fish had reached maturity and spawned at least once. By making harvest of fish up to the minimum length limit illegal, it was hoped that more young would be produced, ultimately increasing numbers of catchable-size fish. This, however, proved not to be the case. Largemouth bass populations protected with length limits did not come to produce any more young than they did

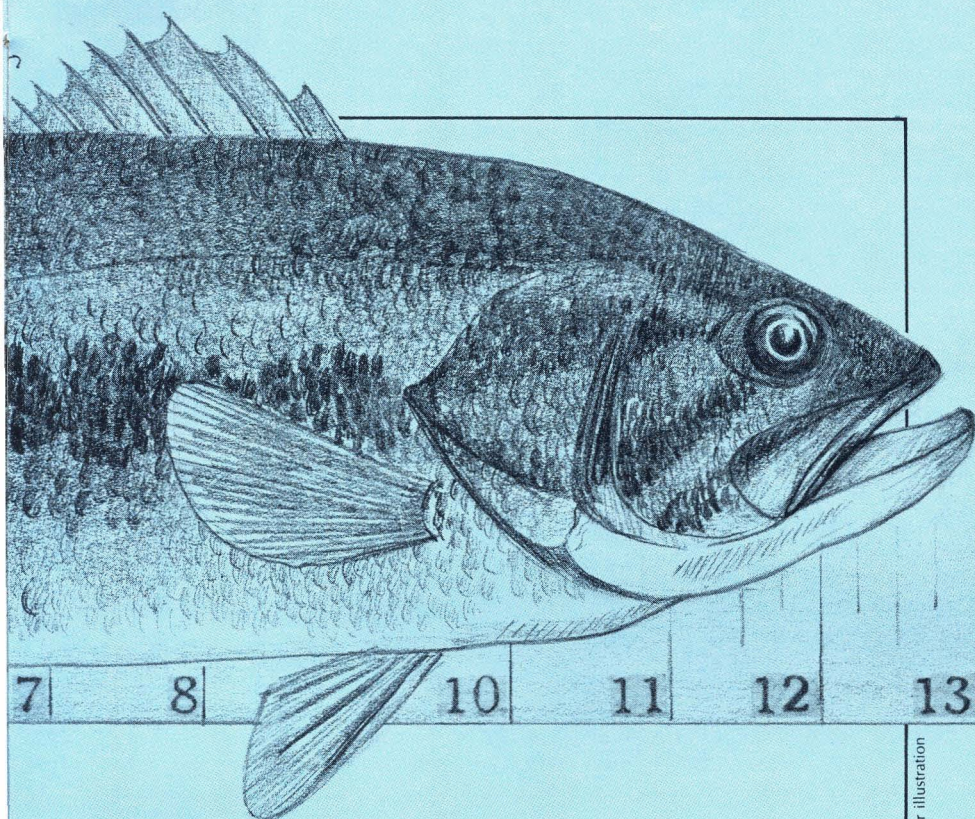
prior to length-limit implementation. We now know the reason for this lack of increased production: Few spawning-size fish are actually required to produce adequate numbers or even a surplus of young. More adult fish did not mean more young fish. Even without length limits, anglers seldom harvested enough fish to prevent or even impact

reproduction. Low minimum length limits also failed to improve largemouth bass populations because anglers seldom cared to harvest largemouth bass shorter than about 10 inches regardless of whether or not a length limit was in effect. Low minimum length limits were thus ineffectual restrictions. This became apparent to conservation agencies



More bass, bigger bass — is this the answer?

Don Gabelhouse



Mike Miller illustration

in most states during the 1950s, and such length limits were by and large abandoned at that time.

In the late 1960s and early 1970s, a renewed interest in largemouth bass length limits developed, but for different reasons than before. With increased numbers of anglers and improved fishing technology, biologists

saw a need to restrict largemouth bass harvest, not for the sake of increasing reproduction, but to maintain or improve adult bass population structure (sizes of fish present), primarily in the interest of bass fishing *quality*. The need to maintain the right numbers and sizes of largemouth bass necessary to control panfish, like bluegill, through

predation, was also a concern. During this period, minimum length limits of anywhere from 12 to 14 inches were commonly imposed.

Again, results from minimum length limits were often disappointing. In impoundments with good spawning habitat and ample food for young fish, over-protection of small adult fish through minimum length limits usually resulted in reduced growth rates because of increased competition for food among individuals. The consequence was an accumulation of fish below the minimum length limit, with few fish ever living to exceed legal length because they died of natural causes first. Anglers caught more fish (often catching the same fish several times) than they did without length limits, but nearly everything caught had to be released. This led to dissatisfaction among fishermen and frustration among fishery biologists. What could be done? Without some protection, angling pressure would decimate a largemouth bass population so that few fish would survive to the large sizes most anglers like to catch. But over-protection of small fish with a minimum length limit would also prevent fish from reaching large sizes.

This dilemma stimulated Richard Anderson, a professor at the University of Missouri, to resurrect a concept first described (but never evaluated) by Robert Martin of Virginia back in 1958. The slot length limit, or protected length range as it was called then, was first imposed on Phillips Lake, Missouri (a private impoundment) in 1974.

How was the slot length limit supposed to work?

According to Anderson, the 12- to 15-inch slot length limit was intended to accomplish four things. First, it allowed harvest of surplus largemouth bass less than 12 inches long (two-year-olds), thus preventing growth problems inherent with minimum length limits. At the time, many considered this portion of the restriction to be asking for trouble, in spite of what was known about results of over-protection. Critics believed that, given the opportunity, anglers would overharvest this size of largemouth bass, preventing survival to larger sizes.



The second objective of the slot length limit was to protect largemouth bass between the lengths of 12 and 15 inches (three- and four-year-olds), and the third objective was to increase the harvest of bass 15 inches and longer (age five and older), made possible by the protection of 12- to 15-inch fish.

The last objective was to maintain enough largemouth bass to keep bluegills under control so that a "balanced" bluegill population was maintained. It was hoped that there would be sufficient numbers of 12- to 15-inch largemouth bass available to prey upon small bluegills, reducing their numbers so that competition for food among surviving bluegills was low and they would grow to sizes of interest to anglers.

From 1976 to 1981, largemouth bass, bluegills, and crappies were sampled each spring from five state lakes in Kansas (Brown, Cowley, McPherson, Montgomery, and Nemaha). Electrofishing boats were used to collect largemouth bass and bluegills, and trap nets were used to capture bluegills and crappies. Fish were measured and weighed to determine changes in size distribution and body condition. Scales were collected to determine growth and age structure changes.

In 1977, 1979, and 1981, anglers were interviewed at the five lakes from March through October to determine numbers and sizes of the three target species (and others) caught and harvested. This information was compared to creel census data collected prior to 1977 so that impacts of slot length limits might be assessed.

How did slot length limits change largemouth bass populations?

The concern that anglers would overharvest largemouth bass less than 12 inches was unfounded. In fact, anglers fishing the five lakes harvested fewer small largemouth bass than desired — despite efforts by the agency to promote harvest of bass under 12 inches! This relative lack of harvest caused the 12- to 15-inch slot length limits to function as something between what was anticipated and 15-inch minimum length limits. Anglers did catch and harvest more largemouth bass less

than 12 inches long per hour of effort after length limits were imposed than they did prior to length-limit implementation. The number taken was, however, not sufficient to keep largemouth bass growth rates from declining once the bass population built to a point where biologists began sampling 20 or more 8-inch and longer bass per hour of electrofishing. The time it took largemouth bass to pass through the protected length range of 12 to 15 inches increased by approximately one year as a result.

Largemouth bass within the protected length range increased in number, and anglers caught and released as many or more fish of this size per hour of effort as they once harvested per hour before slot length limits were imposed. Based on creel census interviews and examination of harvested fish, nearly all fish 12 to 15 inches long caught were also released. This observed compliance with the regulation is supported by the fact that not a single ticket for an illegal-size largemouth bass was written by law enforcement officers on any of the five study lakes from 1977 through 1981.

Another problem anticipated by some also never came to pass. Critics of the slot length limit frequently believed that many 12- to 15-inch largemouth bass caught by anglers would die anyway due to deep hooking. To release such fish, they thought, would be a waste. While a small percentage of fish caught undoubtedly did die from angling-inflicted injuries, windrows of dead bass never appeared. Quite to the contrary, information collected indicated that the same 12- to 15-inch largemouth bass was often caught and released several times, providing recreational value in the process, before being harvested at a length of 15 inches or longer.

With one exception (Brown State Fishing Lake), a combination of reduced growth rates, increased natural mortality within the slot, and harvest of fish once they reached 15 inches apparently offset protection provided to 12- to 15-inch fish. As a result, numbers of large bass did not increase substantially. A ten-fold increase in the number of 15- to 20-inch largemouth bass caught per hour of electrofishing occurred from 1977 to 1981 in Brown State Fishing Lake in spite of reduced growth rates, probably because not many anglers fished for bass. Those few that did seek

largemouth bass in 1981 caught and harvested more 15-inch and longer bass per hour of effort than had been recorded during any previous creel census at that lake. At three of the other lakes, catches of 15-inch and longer largemouth bass per hour of effort may not have increased compared to pre-length limit days, but catch and harvest rates did stabilize at levels between the widely fluctuating rates experienced prior to length-limit implementation. A near-study stream of fish passing through and out of the protected length range provided a more consistent year-to-year supply of fish 15 inches and longer. At the fifth lake (McPherson), largemouth bass 15 inches and longer were documented to have been caught by anglers for the first time in 1981, according to creel census.

How were bluegill and crappie populations affected by largemouth bass slot length limits?

While several studies have documented that largemouth bass predation can be a significant factor affecting quality of bluegill and crappie populations, other forces can also be important. At two lakes (Nemaha and McPherson), expanding gizzard shad populations outcompeted bluegills for food and space. The result was a decrease in bluegills 6 inches and longer. The white crappie populations in these two lakes, on the other hand, benefitted from an additional food supply in the form of small gizzard shad. Anglers reaped the benefits by catching crappies up to and over 12 inches. In both Nemaha and McPherson, impacts of the largemouth bass slot length limit on bluegills and crappies were thus masked by the influence of the expanding gizzard shad populations.

At Brown and Montgomery, white crappie did not appear to be affected by changes in largemouth bass population density. Apparently too few largemouth bass were present even after four years of slot length limits to impact crappies through predation. At Cowley, though, a dense largemouth bass population developed. Electrofishing catch rates of 8-inch and longer largemouth bass increased from nine fish per hour in 1976



to 168 fish per hour in 1981. Few black crappies apparently survived the increased largemouth bass predation, and those that did were soon harvested by anglers once they attained lengths of 8 to 9 inches.

Numbers of 6- to 7-inch bluegills increased at Brown, Montgomery, and Cowley, presumably due to the fact that bolstered largemouth bass populations reduced numbers of young bluegills through predation, decreasing competition among surviving bluegills so they reached older ages in greater numbers. Anglers in many states are pleased to catch 6-inch bluegills, but such was not the case in Kansas. In fact, not a single angler interviewed during creel census in 1981 at Brown or Nemaha said he was seeking bluegills. Of the five lakes in the study, Cowley was the only one that yielded an increase in 8-inch and longer bluegills. Given that it takes bluegills of this size to interest discriminating Kansas anglers in fishing for bluegills, it is not surprising that Cowley was the only study lake where effects of the largemouth slot length limit resulted in improved bluegill fishing. At that lake, the number of bluegills harvested per hour of angling effort in 1981 was double that taken prior to implementation of slot length limits.

Where do we go from here?

Largemouth bass length limits, including but not limited to 12- to 15-inch slot length limits, are appropriate harvest restrictions given today's demands on fishery resources. One of their benefits, often overlooked, is the recreational value realized when several people are able to catch the same fish at lengths of 12-15 inches, before it is ultimately harvested at a length above this. Surely this is wiser use of a resource than the catch and immediate harvest of a 12-inch fish.

From the slot length limit study, the Kansas Fish and Game Commission learned much about fish population dynamics beyond the impacts of length limits. Among these was a better understanding of bluegill management. To produce a bluegill population with sizes of fish that will interest Kansas anglers, gizzard shad must not be present and the largemouth bass population must be

dense. This requires good largemouth bass spawning habitat, adequate food for young bass, and clear water so all sizes of bass can be effective predators on bluegills. Lakes like this are probably best managed with a 12- to 15-inch largemouth bass slot length limit, giving the angler who wants to harvest a small largemouth bass the opportunity to do so. Based on the slot length limit study, there is little concern for overharvest of this size of largemouth bass, at least in rural Kansas lakes like those studied. A certain harvest of largemouth bass less than 12 inches is, in fact, necessary to keep bass from becoming too dense. The highest percentage of largemouth bass in a lake so managed will be small (less than 15-inch) fish, and a low percentage of largemouths caught by anglers will be large fish, but the actual numbers of large bass will be as high or higher than in lakes without a length limit or in those with lower overall bass numbers.

Even though largemouth bass numbers increased in some study lakes, the increase was not sufficient to produce a density of bass that could impact bluegills such that bluegills large enough to interest Kansas anglers developed. At the same time, largemouth bass growth rates declined because of insufficient harvest of small bass. If a lake won't produce high numbers of largemouth bass, or if gizzard shad are present, it is probably best to forget about managing bluegill as sportfish and concentrate efforts on improving bass fishing quality, using bluegill primarily as bass prey. To accomplish this, numbers of small largemouth bass need to be reduced. This might be best accomplished by raising the lower end of the protected length range, allowing anglers to harvest large fish. This length should correspond to a size of fish anglers will accept, without resulting in overharvest before fish can move into the slot. A conservative approach would be to set the lower end of the slot at 13 inches.

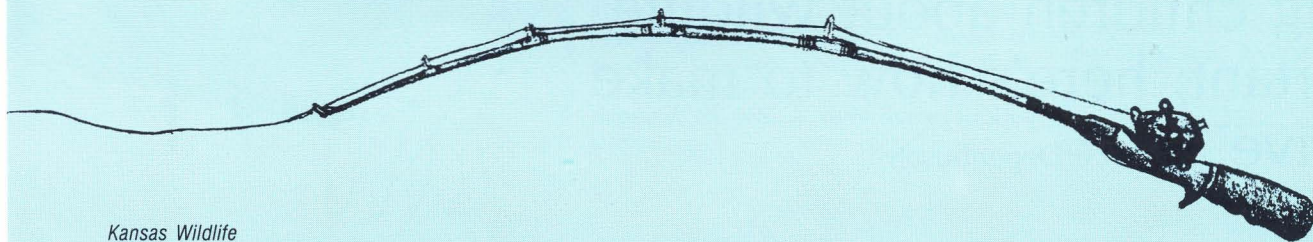
From our slot length limit study, as well as studies in other states, it has been found that harvest by anglers does not allow many fish to survive much past the upper end of a slot length limit or the measure of a minimum length limit. Neither a 12- to 15-inch slot length limit nor a 15-inch minimum length limit will produce substantially more 18-inch largemouth bass. To increase production of largemouth bass longer

than 15 inches, the upper end of the slot must be raised past that mark. In deciding what length should correspond to the upper end of the slot, fishery managers must consider largemouth bass growth rates, longevity, and density. If the length corresponding to the upper end of the slot is set too high, natural mortality will prevent fish from exiting the protected length range. In most cases, enough fish should survive protected sizes that they are caught with at least some regularity by anglers. Given Kansas conditions affecting largemouth bass growth, longevity, and density, an appropriate upper end of the slot might be 16 or 17 inches. An exception might occur when catch-and-release provides more recreational value to anglers than does harvest. In such an instance, the upper end of the slot might be set at 18 inches, its goal not to increase numbers of 18-inch and longer largemouth bass, but rather to produce multiple catches of bass up to 18 inches.

Unfortunately, many of the lakes and most of the federal reservoirs in Kansas do not contain the elements necessary to produce an abundance of largemouth bass. Muddy water and lack of near-shore habitat are particular problems. Use of slot length limits for such impoundments is inappropriate.

The question of whether or not to even manage largemouth bass in a system with limited bass production capabilities must be answered, at least in part, by anglers. If fishermen on such an impoundment express no desire to catch lunker largemouth bass and are satisfied with a harvest comprising 8- to 12-inch fish, length limits may not be needed. If, however, anglers want to catch fish 15 inches and longer, minimum length limits of 15 inches or higher would be appropriate.

Length limits of all kinds can be effective management tools. They improve fishing the most when overharvest by anglers is the limiting factor in fish population size or structure. Length limits are least effective when other factors limit fish abundance through mortality at a size too small for anglers to catch. It's hard to improve the quality of fishing with length limits when most of the fish in an impoundment never reach their first birthday. In any case, length limits are not a panacea, but merely one of the tools a fishery manager has at his disposal to improve the quality of fishing. □



Basic education is getting a lot of press these days. No one denies that having a firm grasp of reading, writing, and mathematic skills provides children with a foundation for learning other subjects. But there are other important skills that should not be ignored.

One of these is wildlife conservation. Through the Fish and Game Commission's Wildlife Education Service, students in Kansas are provided with an opportunity to learn about wildlife resources. This free service is available to

every public and private school in the state. It includes wildlife education curriculum materials, a free-loan Wildlife Reference Center, inservice workshops for teachers and administrators, and the "Nature's Notebook" section of this magazine.

As important as wildlife concepts are to biologists, facts and figures are not always interesting to children. The trick for educators is to make the information applicable to everyday life. It is easier to retain relevant information when you

Wildlife in the Classroom

Teaching children about wildlife is important; here's how to make it effective. Joyce Depenbusch



get involved. An old Chinese proverb illustrates this idea: "Tell me, I forget. Show me, I remember. Involve me, I understand." Whether it's dissecting animals or taking field trips, hands-on experiences are the most lasting. And these are what the Wildlife Education Service is all about.

The Service's curriculum materials have been written for the elementary grades. At each grade level, concepts brought out in the student's booklet are reinforced in the teacher's guide. The

materials are designed so that they are ready to use and fun for both student and teacher. Teachers are provided with worksheets, bulletin board ideas, supplementary activities for all subjects, a glossary of terms, and a list of resources and references. The worksheets vary from crossword puzzles of vocabulary words to three-dimensional models of animals. The curriculum materials cover many subjects, so ideas about wildlife can be taught in reading, art, math, or social studies classes, as well as in science classes. Both indoor and outdoor lessons are included.

Preschoolers and kindergarteners relate to wildlife through a study of the alphabet, seasons, numbers, colors, and growth charts. First-graders learn more about the needs of wildlife by comparing them to the needs of humans. Second-graders investigate what several Kansas animals eat and how they get their food. In third grade the children discover what kinds of animals are found in the different habitats in the state and are given suggestions for ways to improve wildlife habitat. Threatened and endangered species are covered in the fourth-grade curriculum. Fifth-graders study animal classification by becoming aware of the characteristics and behaviors of different animal groups. Sixth-graders build on the work done in the past grades through an in-depth study of the habitat needs of wildlife.

Materials for 7th through 12th grades are being planned, though a distribution schedule has not been set. These materials will involve the students in simulation games where they make decisions on issues such as water use or habitat alterations. Carrying capacity, population surplus, and habitat loss are some of the concepts that come into play.

The materials can easily be adapted from one grade to another to augment an existing curriculum. Each program is strictly voluntary, and a comprehensive evaluation of the program is underway so that improvements can be made where needed. The bottom line for any education program is: does it reach children?

To be effective, materials must be used. Delivery of materials to each school district does not guarantee their use. It's a good idea to check with your local school district to see if the Wildlife Education Service materials are available in your area. Libraries and media centers frequently house the materials so that they are in a central location.

Some teachers hesitate to introduce material of which they have limited

knowledge. They don't want children asking questions they can't answer. Well, no one knows everything about our environment, and KF&G provides a resource library of materials dealing with wildlife and related topics. The Wildlife Reference Center is a free-loan service to Kansas schools. It contains films, filmstrips, slide series, educational games, field guides, teacher's guides, posters, computer software, video-tapes, and other resources. Because no one teaching style is effective for all students, the large selection of formats in the Reference Center prompts learning in a variety of ways.

One unique feature of the Center are the skin and skull sets, obtained from road kills or confiscated pelts that were illegally harvested. Touching animal furs and bones can be an unusual experience for someone who has only seen pictures of an animal, or at best watched it from a distance. Something that would otherwise not be used makes an exciting learning tool for both student and teacher.

Due to the great demand, use of the Reference Center materials is on a first come, first served basis. Return postage is the only expense to schools. Use is restricted to Kansas schools and organizations, and we ask users to treat the materials with care. Write to the Wildlife Reference Center at the Pratt headquarters for a copy of the Center's catalog. It contains a description of all available items, the time limit for checking materials out, and the appropriate grade level for use.

Inservice teacher workshops are also available from KF&G. Teachers and administrators are given the opportunity to learn more about our wildlife resources, gain confidence in a variety of outdoor subjects, and get involved in activities that will give their students a general understanding and appreciation of wildlife. Graduate and undergraduate courses and workshops are also taught at several of the state's colleges and universities.

If we want a concerned, outdoor-oriented public and an abundance of wildlife, we must inform our young people of things wild and processes ordained by nature. With that in mind, wildlife study is truly a basic part of education.

For further information contact Joyce Depenbusch, Wildlife Education Coordinator, Box 54A, R.R. 2, Pratt, KS 67124 or call (316) 672-5911, extension #168.



Phyllis Epps illustration

The Underground Bird



There aren't many trees in western Kansas. This resourceful owl doesn't care if it finds one or not.

Mary Kay Spanbauer

photos by Mike Blair

Beneath the Kansas prairie sod lives an unusual bird: the burrowing owl. True to its name, this peculiar little raptor inhabits underground dens. It also breaks owl tradition by being diurnal in nature. That is, the burrowing owl is active during the day, most active at twilight. Its extraordinarily long knock-kneed legs, in combination with an unusually short tail, give the burrowing owl the appearance of being much taller than its average height of 10 inches. The small head is compact and round, lacking ear tufts.

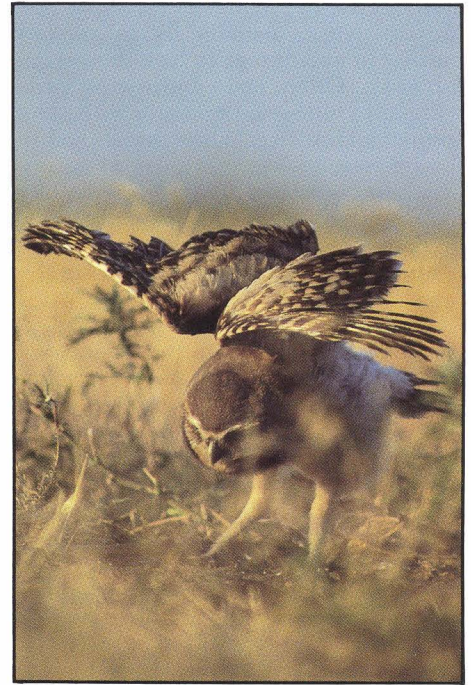
Burrowing owls occur throughout the plains of western North America. Their range extends into Central and South America, with isolated populations in Florida and the Caribbean. Here in Kansas, they make their home in the western two-thirds of the state, in short-grass prairie habitat. They prefer wide open grassland — treeless, unbroken prairie with a slightly sandy soil. In spite of their fondness for undisturbed areas, burrowing owls have been known to take up residence near agricultural lands and urban centers.

The burrow is the center of this little owl's social life. It is used for nesting, shelter, and protection from predators. Capable of digging their own in a pinch, burrowing owls are opportunists and would rather pilfer burrows from prairie dogs and other mammals. The ideal burrow tunnel meanders below ground like a lazy stream and extends from four to eighteen feet. The nesting chamber is an enlarged area at the end of the tunnel. Burrowing owls use their wings, beak, and feet to modify and remodel the "borrowed" burrow to their specifications. Housekeeping involves lining the burrow, especially the nesting chamber, with cow or horse manure. Other materials may be used in the absence of manure. At the Oakland Municipal Airport in California, burrowing owls reportedly line their burrows with divots from a nearby golf course. It has been suggested that the manure, or other linings, may be used to mask the owl's scent and mislead predators.

Burrowing owls are migratory and arrive in Kansas in the early spring to nest. Courtship involves a wierd assortment of calls and acrobatics. An average of nine eggs are laid in a single horse-shoe-shaped layer in the nesting chamber. Burrowing owl eggs have been found from April 11 to July 1, although the nesting peak occurs in mid

May. Researchers speculate the burrowing owls have large clutches of eggs to offset the increased rate of chick mortality faced by ground nesters. Eggs are laid at intervals up to 72 hours apart. Incubation begins after the third or fourth egg and continues approximately one month until the young hatch.

The owlets have a voracious appetite and keep the parents busy 24 hours a day scouting for food. If the adults appear awkward on their stilt-like legs, the juveniles, without the benefit of fully developed plumage, look absolutely uncoordinated. When they venture out during the third week, they hop about gleefully, preening themselves and getting in a few practice wing strokes. They stick close to the burrow and at the first sign of danger bowl one another over in an attempt to reach the tunnel entrance and tumble in. They practice foraging techniques by hopping on and crushing dead insects. Airborne at four weeks, they don't become adept fliers until the sixth week. At first the young burrowing owls do little to obtain their own food, but in time join the adults on foraging expeditions. By early fall the pairs, families, and colonies begin to break up. Burrowing owls migrate early from their northern ranges, but some stick around Kansas until December. Records from the 1800s indicate that burrowing owls



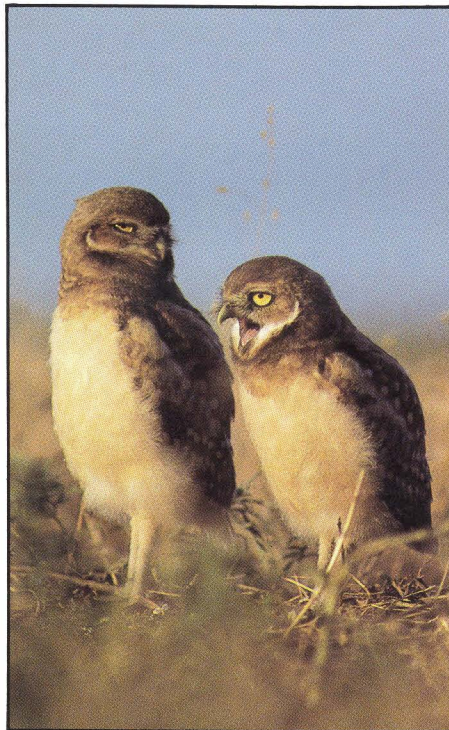
A juvenile burrowing owl tests its wings. Graceful fliers as adults, the young don't become airborne till their fourth week. The owls migrate out of Kansas during late fall, to spend the winter in warmer climes.

overwintered in some areas of western Kansas.

The burrowing owl is a compact bird, but for all its apparent awkwardness, an adroit flyer. Its flight is distinctive, undulating at first but strong and fast as the bird gains altitude. Burrowing owls don't often hunt from the air, though, preferring instead to sit on fenceposts and other elevated sites and let their prey come within range of a swooping attack. Their acute sense of hearing can detect the rustlings of an insect as far as 100 yards away, and their eyes are equally keen. Because of its hearty appetite and insectivorous habits, the burrowing owl, like the barn owl, is of economic benefit to man.

Lacking the luxury of a tree escape, burrowing owls must rely on their burrows and communal living system for protection. When danger threatens, burrowing owls characteristically bob their heads in an effort to warn other creatures in the vicinity. According to one observer, "the bird will stand staring gravely and almost regally at the disturbance for a moment, and then it will suddenly bow with a sense of courtliness, recover its erect pose quickly, and begin rolling or jerking its head about in a strange and rather comical manner while uttering its alarm call."

When one bird is threatened, alarm calls ring through the entire colony to



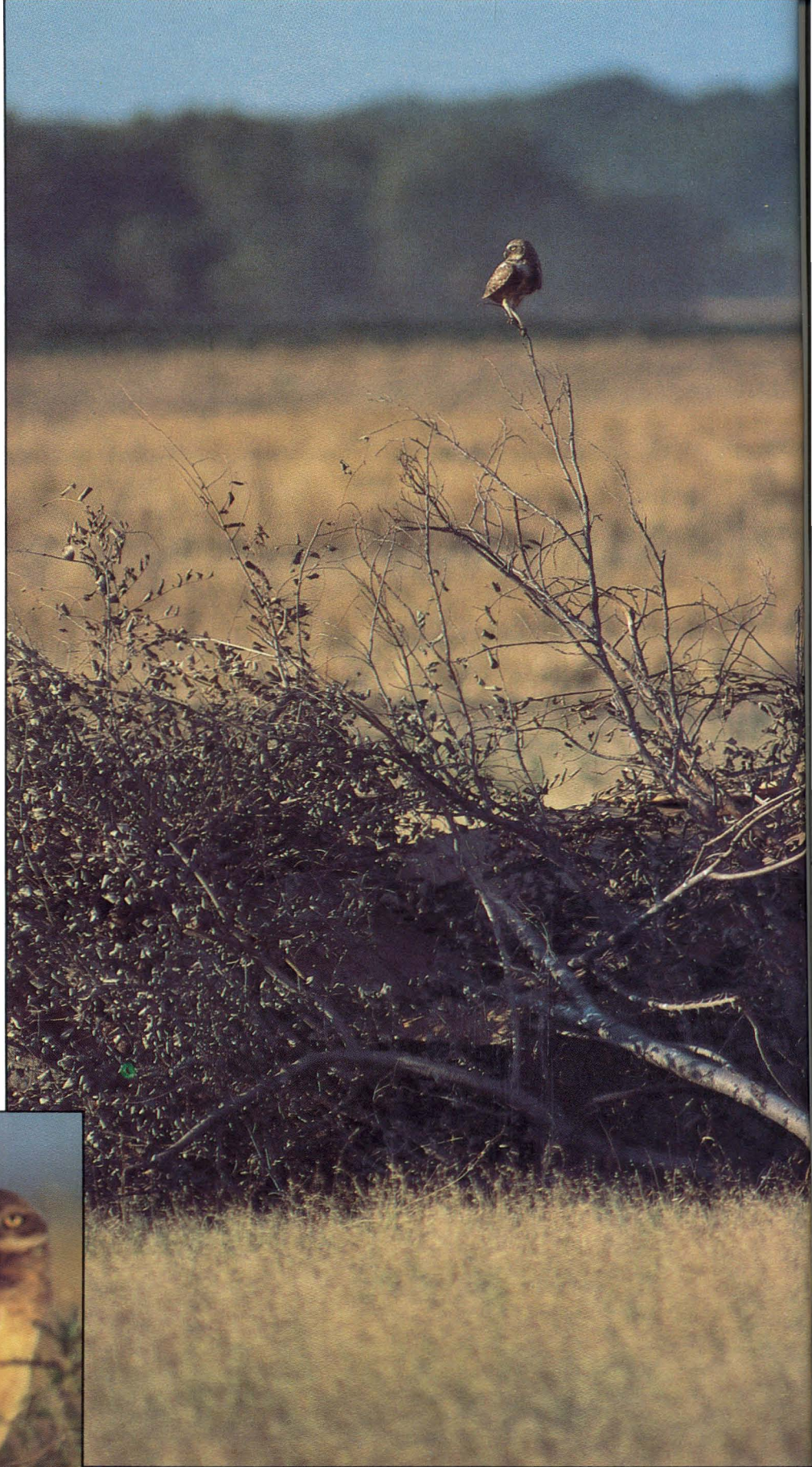
These young burrowing owls are waiting impatiently for Mom to bring in a mouse. The birds are gregarious, living as they do in the burrows of communal rodents, and one prairie dog town may hold several owls.

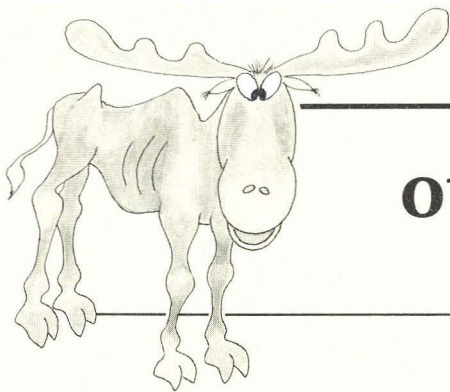
alert all to the danger. If young are present, adults usually fly to another burrow in an attempt to lure the predator away. Often male burrowing owls will mob a terrestrial predator with great spunk and ferocity. When threatened in the burrow, owlets make use of an unusual, but effective tactic: They imitate the warning rattle of a rattlesnake. Few predators, however hungry, will dare venture into a burrow after hearing the buzz of a rattler!

The future of this unique underground owl is uncertain. Burrowing owl populations have declined in recent years. Authorities attribute this decline to two factors: the loss of habitat due to land development, and the loss of burrow sites resulting from the widespread control of burrowing mammals. The use of poison for rodent control not only destroys preferred burrowing owl habitat by lowering the number of small mammals like prairie dogs, but may also result in indirect poisoning of the owls.

Measures can be taken to minimize the deleterious effects of farm practices on burrowing owl populations. When rodent control is deemed necessary, non-lethal methods can be used. Control can also be limited to periods and locations not critical to owl survival. The alteration of prime burrowing owl habitat can often be avoided and land use decisions made that protect the fragile shortgrass prairie ecosystem. We would all do well to remember, when we think of "improving" the prairie, that other creatures like it just the way it is and may not even survive a change. □

Hunting owls prefer to sit on an elevated perch, waiting for insects or rodents to come within "swooping" range. Land development and poisoning programs aimed at rodents have jeopardized the future of burrowing owls in Kansas. There's still time to reassess our prairie priorities.





off trail

... with Stub Snagbark®

It'll be bow season soon. That's why I stopped at Fletcher's the other night — to borrow some broadhead glue. "What's the password?" Fletcher asked, as he opened the door.

I must have looked puzzled.

"I'm working for the Defense Department now," Fletcher said. "It's a secret project. But you can come in anyway."

As I stepped inside Fletcher walked over to the coffee table. He bent over and picked up a tiny item. It looked like a small transistor.

"What's that?" I asked.

"A small transistor," he said.

"What's it for?"

Fletcher bade me sit down. "This little jewel goes on an arrow head," he explained. "The tip is designed to penetrate the armor on the latest Soviet tanks. Upon impact the shaft separates from the head and drops off. The transistor is thus implanted. It picks up the voices of the men driving the tanks and gets their orders from the air as quickly as they do. When it's perfected it'll be the most sophisticated bugging system in the world."

"You're calling yourself an agent?"

"No, a secret agent. You have to be selected." Fletcher's tone was condescending.

"By who?"

"Well, you might say Cap Weinberger himself. You see, I read in the paper that he was looking for an alternative weapons system — one that wasn't so costly. Part of the move to reduce the deficit, I think. Well, I came up with this idea and decided to bounce it off Cap, so I called him."

"You called Caspar Weinberger?"

"I couldn't get through to Ronnie."

"You actually talked to Weinberger?"

"Not exactly. I got his number two man on the phone and told him I could produce an anti-tank broadhead and transistor unit for \$27.50 apiece. He told me to go ahead with the project. Actually, they're only going to cost me \$25 each to build; but I pay taxes, and it's

about time I got some of that money back."

"I don't think an anti-tank broadhead is a very good idea, Fletch."

"Why?" My friend asked, defensively.

"First, if you can get close enough to a tank to shoot it with an arrow, why not blast it with an explosive shell the diameter of a paint can?"

"That's easy. You wouldn't know what that tank was going to do if you blew it up before it got its orders."

"And how are you going to design an arrow that will penetrate armor plate?"

"I'm working on that. My advanced testing so far has been on that Caterpillar blade sitting out behind George Burwell's barn. He doesn't seem to mind me shooting at it."

"Don't you break a lot of shafts on that blade?"

"Yes, but that's all part of the project. I'm tallying my costs, and they'll be submitted to Cap's underlings as part of R & D expenses. So far the Defense Department owes me \$92.63 for shafts and roughly eight bucks for exploded nocks and wasted fletching. The arrow head account I keep separate."

"What other weapons are you researching?"

"Well, I'm trying to perfect a heavy-duty shaft for specialized missions like bugging submarines."

"Submarines!"

"You shoot carp, don't you?" Fletch was indignant.

"I can't really believe the Defense Department is interested in archery equipment of any kind. This is the nuclear age! Why would the administration even entertain the thought of using primitive weapons in a war?"

"Lots of reasons. Cost is one, of course. Then there's the political plus of having a weapon with no nuclear capabilities. People warm up to armor-piercing arrows a lot more quickly than they do atomic warheads. I've already done a survey on that."

"But the purpose of any weapon is to

defeat an enemy. Can archery tackle really compete with Soviet military hardware?"

"Not now, Stub. But the beauty of the bow is that no one will suspect we're developing it. A Soviet spy flying over Burwell's hog farm probably won't even bother to take a picture of me shooting arrows at a Caterpillar blade. If we could get the Russians to agree to a verifiable freeze, we could still carry on some pretty extensive testing without them knowing about it."

"But if we could get that kind of agreement, we wouldn't need to test."

"That's where you're wrong," my friend said, a dash of melodrama in his voice. "I think conventional war is on the comeback. It went out with the big bands and is overdue for a revival. Modern archery gear should compete favorably with some of the weapons used in trench warfare."

"Aren't you being a little sadistic?" I asked.

"Not at all. Look at the big swing to '50s music and short haircuts. Who would have predicted that?"

"Let's say you do manage to sell the administration on archery weapons. Who's going to tool up for a military contract?"

"We can initiate production here. In the basement, I mean. And I can take my firewood out of the garage to make a stockroom. George says I can use his farrowing house after April, and Dusty Benchly will give me half his taxidermy studio."

"You can't supply the U.S. armed forces from a basement workshop!" I cried. "Do you know how many arrows will be required? And how many transistors? Heck, you'll have to buy Hitachi just to fill orders for those!"

"Don't get the cart ahead of the horse," my friend said calmly. "Remember, Cap has to agree to my price first. Armor-piercing heads will be expensive. I don't think I'll charge any more for left-wing than right-wing fletch, though, even if it will cost extra to tool up for both. Everybody ought to give the government a break once in a while. I'm also thinking of offering free blaze-orange tracer ribbons with every dozen arrows as an introductory promotion. What do you think of that idea?"

"I think you'd better be sure of your market first. What if Cap and Ronnie decide on another weapons system?"

"Then I'll just sell my secrets to the Russians. In fact, I think I'll give Mikhail a call right now. What time is it in Moscow?"



*Let a man once begin to think
about the mystery of his life and
the links which connect him with
the life that fills the world, and
he cannot but bring to bear upon
his own life and all other life that
comes within his reach the
principle of reverence for
life . . .*

—Albert Schweitzer

