The background of the cover is a photograph of a blue pond with several ducks. One duck is in flight on the right, another is swimming on the left, and others are visible in the distance. The water has a textured, rippled appearance.

KANSAS FISH & GAME

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**SPECIAL
KANSAS
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SECTION**

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KANSAS FISH & GAME

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Flying teal and shoveler and great blue heron by Ken Stiebben

OBSERVATIONS

on the shooting sports

MAYBE WE'RE NOT OLD ENOUGH

By

Grits Gresham

Shooting Editor, Sports Afield
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The trumpets sounded, and, lighted by the flickering of a dozen torches, the head gamekeeper walked forward. Reading from a scroll, he recited the results of the day's hunt by species and by sex.

With a nod our host accepted the report, and the hunters moved to examine the harvest. The birds we had shot that morning and afternoon were arranged in neat rows on the lawn. Cock pheasant were in one area, their brilliant plumage enhanced by the flares. Hen pheasant lay side by side. Drake mallard were displayed in one row and hen mallard in another. The feathers of each bird were carefully smoothed, giving the game an air of dignity, even in death.

I saw this ceremony at La Mandria, the estate of the Count de Medici near Torino, Italy, after a hunt given for a

group of American journalists. Most of us had never before experienced such fanfare. I was impressed, but at the time, a decade ago, I couldn't quite say why.

At another time and place, far across the Atlantic in the Andean foothills of Argentina, a small *hosteria* buzzed with festivity. Glasses were raised on high with toasts to man . . . and to beast.

On a table in the center of the room was the head of a magnificent red stag shot that day. Massive antlers stretched toward the ceiling, a trophy that would soon rank high in the world-record books.

I knew then what it was about La Mandria that had impressed me. It was the esteem, almost reverence, accorded the game itself. The birds were treated with respect, even after death.

The celebration in the *hosteria* was in the same spirit. It was in honor of the kill true enough. The taking in fair chase of a magnificent animal. But the stag itself was the featured guest.

Such pageantry isn't a part of the American tradition. In this country, hunting evolved from a necessity—a means of acquiring food—into a sport. And it was not long ago that that evolution took place.

American hunters will abide by game laws, some of the time; they prefer to seek their game in fair chase, most of the time; and they are willing to liberally finance research and management of wildlife all the time. Beyond that, however, most of us don't place much emphasis upon the individual animal or bird. Hunters in many other parts of the world do.

I got that message in Africa, on a safari in Kenya. The very first shot I fired was at an old wildebeest. We wanted him only for leopard bait, but the raking shot didn't keep him down. We followed him for two hours in a drizzle until darkness ended the search. That night the wildebeest undoubtedly made a meal for a lion, leopard or hyenna, so it wasn't wasted. But my professional hunter was making his point—that wounded game must be pursued as long as necessary or possible.

Each individual animal, even an aged wildebeest destined for bait, is important.

Perhaps this country hasn't been around long enough for us to feel about

game as most Europeans and some other world hunters do. Could it be that we must lose what we have before we reach the point of appreciation?

Would you be more appreciative of a buck if you had to pay a trophy fee after you made the kill? Taken one step further, would you value that animal more if simply wounding it cost you that fee? In many areas of Europe and Africa, and some in South America, a hunter pays the price whether he kills or wounds the game. That is literally a foreign thought to us, but consider: a wounded trophy is usually taken out of the area's wildlife inventory, whether retrieved or not.

I neither want nor recommend such a system for us. I don't believe we will ever let our wild areas and the game on them shrink to that point of stark scarcity; indeed, it is a fact that most species are in better supply now than half a century ago.

But I do strongly urge that we borrow a bit of the European attitude toward gamebirds and game animals. I don't think the trumpets and the flares are for us, although that scene raised a few goose bumps for me. But a little fanfare and flourish wouldn't hurt.

I especially would like to see us show more respect for wildlife, after the shot as well as before it. The next time you pick up a pheasant that fell to your gun, smooth its feathers and reflect upon what you've done. Appreciate. Pause five minutes before starting to field dress the bull elk you just tagged, and consider what it's all about.

The ceremony isn't for the game; it's for you and me. Granting game the dignity it deserves is a part of being the ethical hunter. Not only is this an attitude that does credit to the individual, but it is one that our society will come to demand of hunters collectively.

We have just celebrated our bicentennial. All Old World countries have experienced several of those, and then some. That could well be the difference.

Maybe we aren't old enough.

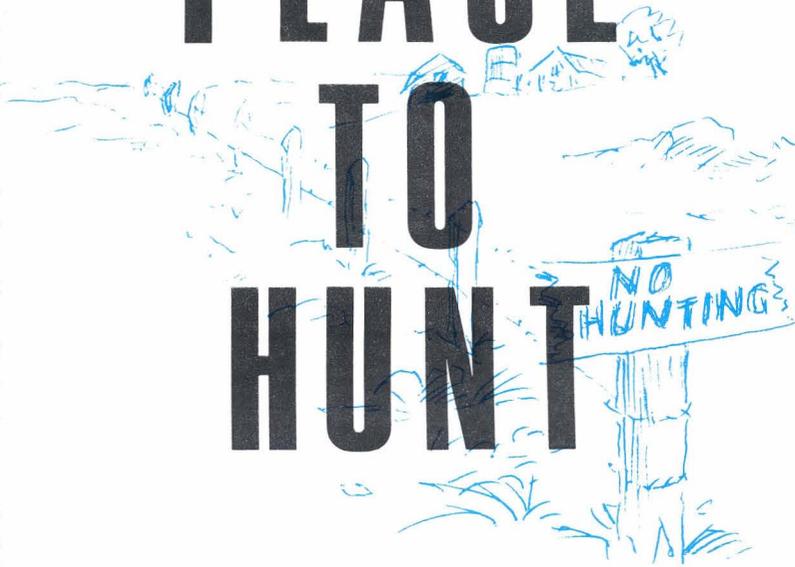
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It wasn't too long after I bought my first hunting license that my hunting got complicated. I had my own .22 and the use of my dad's shotgun. I could drive to a hunting spot instead of walking, and if I broke down a fence or neglected a gate while I was there, I was expected to stand for the damages on my own. I was also old enough to understand trespassing. Ground that had been open to a stray boy and a mongrel dog was suddenly closed to a serious hunter with a twenty-gauge in the back seat. It was a shock, and in another few years I ran into a more difficult underlying problem. In order to satisfy my first casual curiosity about a piece of cover, I had to get permission just to scout it. Finding a landowner and asking was often an effort, and I didn't want to waste my time and his unless I was reasonably sure the place was worth asking about.

Boiled down to its essentials, the problem is familiar to all hunters. For one reason or another, a hunter can't check every inch of available cover; he has to develop the ability to assess a piece of ground from a distance. The instinct develops by trial and error over a thousand slow days and a dozen or so good ones. Just the color of a cover patch will turn an old hand on or make him decide to skip to another area. To most hunters, the connections between color and plant names aren't specific, but over the years, those colors become associated with a pheasant rise, rabbit flush or the last fox squirrel that went in the game bag. Different colors mean different plant species and a variety of food sources and cover types—safe nesting, easy winters and security for wildlife populations.

Some kinds of land protect their cover better than others. I've always found a special fascination in streams probably because running water eventually cuts into a hill, floods a bench, and claims a strip of real estate from surrounding farmers. These corridors of habitat are vital to Kansas whitetails and support populations of most other game animals as well. Riding with veteran hunters, I've often noticed that their feet come off the accelerator as they approach a bridge. They slip out on the span at thirty miles an hour or so, peering up and down stream. Creeks tell a lot about the country they cut through, and little of the message is lost on an experienced boondocker. Steep mud banks are a sign of deep topsoil, and they contain a creek well so that the farmer upstream can plow right up to the edge. A bigger, broader stream, low-banked with plenty of snags, will fend off the fields on either side with high water after a good thunderstorm. Give me a limestone-bound creek that winds up against a line of hills. Even though I can't see them from the road, I know there will be timbered bluffs and weedy draws somewhere in the distance. If there are ravines and broken ground anywhere, they're most likely to be found, unplowed and quail coveyed, along the creeks.

A PLACE TO HUNT

A blue ink sketch of a rural landscape. In the foreground, there's a wooden post with a sign that says "NO HUNTING". The background shows rolling hills, a few houses, and some trees. The sketch is done in a simple, expressive style.

Chris Madson

Hills and agriculture don't mix well; they're dangerous for tractors and don't generally hold enough soil to make the plowing worth the effort. As a result, they are often wildlife sanctuaries. And, conveniently enough, they usually leave an indelible mark on a map, so they can be scouted from a kitchen table. Any time the neat rectangular pattern of blue-line back roads on a map starts to break down into cobwebs, there are probably some respectable hills involved, good places to start looking for huntable coverts. A few methodical hunters sidestep the guesswork of using a road map for locating hills by using topographic maps. Contour lines detail the lay of the land, and streams, marshes, and little-known ponds are usually marked as well. Even the vegetation shows up to some degree, although the tints that mark grassland and forest refer to the condition of the land when the map was made and may be out of date. In Kansas, copies of these maps can



Ken Stebben

be bought from the Geological Survey, Kansas University, 1950 Avenue A, Lawrence.

Finding good cover is the easy part. The challenge comes in tracking down its owner. There was a time when asking permission on a piece of land was a simple matter of finding the nearest farmhouse and knocking on the door. Those were better times for hunters and wildlife. The farmer was closer to his land, and that made him easier to find and usually more concerned about the wild critters he saw every day behind his barn. On the modern landscape, though, the hunter has to deal with the absentee landowner. Many times, the man who still lives on his farm won't be able to tell you who owns the ground next door or how to find him. This situation has made a trespasser out of many an honest hunter who finally gave up hope of finding a landowner and sneaked out into the cover figuring that anyone who lives that far from his prop-

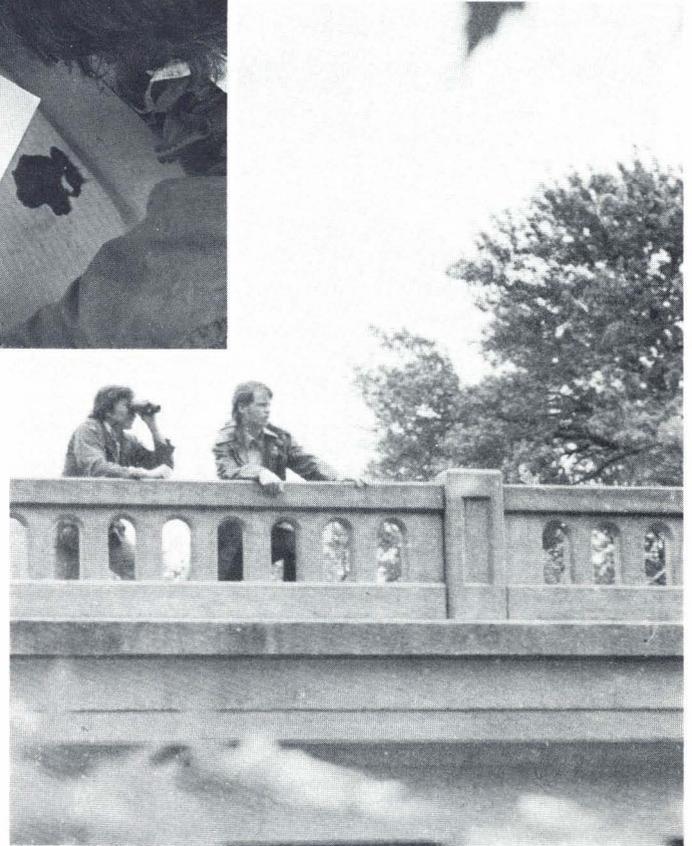
erty isn't going to miss a few pheasants. It's illegal, but, more important, it ruins a hunt for anyone with a shred of conscience. A pheasant deserves (often *demands*) undivided attention, and it's tough to give him that when you're looking back over your shoulder for a slow-moving pick-up.

With a little planning, it's not too tough to find the owner of a piece of property. There isn't a county in the nation that doesn't have some sort of land ownership record. Many county clerks or abstract offices carry what we used to call platt books back in Illinois. These books have a map of each township in the county with owners and property boundaries marked. Besides the obvious advantage of knowing who owns what, the platt book can make a discussion of property boundaries a lot easier to follow. There's something about line fences that just can't be described in words. About the most confused I have ever been was on the back stoop



Ken Stuebben

Binoculars are a big help when taking a close look from the road. Coupled with good topographic maps, they can tell a hunter a lot about a piece of ground, but they can be misleading. Cover tends to look thicker than it actually is through binoculars, and the hunter should keep in mind the harvest dates in the area he's scouting. Domestic crops may lose their fascination for wildlife after they've been cut and plowed.



of a farmhouse in the hill country up next to the Missouri River. I had gotten permission to hunt and was trying to clarify boundaries. The farmer made an honest effort to tell me where his lines ran, and I made an honest effort to understand. Didn't do any good. We gave up after an hour or so. He went back into the house, half mad, mumbling something about sending me a map, leaving me on the porch trying to orient myself. Luckily, I had parked my car next to a lone elm in the farmyard. Without the tree, I probably would have spent the night looking for my transportation.

Rural residents in most Kansas counties receive a directory which not only gives the phone numbers of other residents in the county but shows where they live on township maps in the back. Most businessmen in the county advertise in the book, and if they can't find you a copy, Central Publishing Company in Iola prints them up for \$10.50 apiece. This book is often more up-to-date than a platt map of the same area, and it can save a lot of time on a scouting expedition, especially when someone gives you the name of a landowner but

says with a casual gesture toward the northeast, "Yeah, he lives over that direction six or eight miles."

The return on the investment of scouting cover often depends on the way the first meeting with landowner is handled. Introductions are awkward at best, but it's important for the landowner to know who he's dealing with. A hunter who takes the time to ask permission, then gives his name and where he lives isn't likely to damage property, and if he does, the farmer at least knows where to start looking for him. The hunter who lives close by usually has an added advantage for the same reason.

It's probably a good idea to let the owner know what kind of game you're after. Understandably, some farmers save the opening on pheasant or quail for their families or want to protect the bobwhite covey that comes up into the farmyard in January. A rabbit hunter or late-season bird hunter improves his chances on such farms by stating his preferences early in the conversation.

Probably most important, a serious hunter does all



Ken Stiebbin

his asking well before the season or well after the opening. Opening days bring out the worst in hunters and landowners alike. On the other hand, I've always had the feeling that asking a couple of months ahead of the opener catches the farmer by surprise. He's more likely to be neutral on the subject of hunters in late summer than he'll be at any other time of year. And the hunter who shows up on the back stoop in late December sometimes has the farmer's sympathy. For

most farmers, anyone who would look for birds in mid-winter has to be serious about his hunting, maybe a little bent in the head, but a harmless character to have on the place.

Landowners vary in the ways they like a hunter to operate. Some would just as soon not see a man's face after the season has started; others like to know who's on their ground and prefer to have gunners check in before they hunt whether they have permission or not. Some farmers have special areas they don't want hunted. Many prefer to have hunters park in the farmyard; others don't care where the car is parked as long as they know who it belongs to. All these preferences are reasonable, and a hunter who wants to be invited back will do well to ask about them.

Another question worth asking is whether or not the family eats game. Often, they don't, but when they do, it's wise to deliver a few birds, *dressed and ready for the pan*, to the kitchen from time to time. In these days of clean farming, the farm that has wildlife usually has it because the owner has gone to the trouble of raising

it. It seems only right to provide him with a little of his own wild meat if he wants it.

While the majority of farmers don't do much hunting, a few enjoy walking up a bird during the season and having wildlife around the rest of the year. A friendship with a man of this cut is to be treasured. He's likely to take game management seriously, and he's in a perfect position to apply textbook management to the day-to-day cultivation of the land. Such men, if they are generous, may let their neighbors hunt the cover they have developed, but I know at least one who has stopped giving permission to the "clean" farmers nearby, commenting, "When they plant, they don't think wildlife is worth the effort, but, come fall, they're ready to come over and shoot my birds. Let them raise their own; they can afford it as well as I can." The wildlifer-farmer often has similar feelings about the once-a-year pseudo-hunter from town, but he may open up to someone who has a real interest in hunting and the wildlife that support it.

An Iowa friend of mine was lucky enough to stumble into a farm of this kind a few years ago. It was owned by two bachelor brothers past retirement age who were looked after by their maiden sister. Glen and his boy stopped in from time to time during the summer to talk awhile and help with some of the heavy lifting. If there was hay to be put up or a disc that had to be hitched up, the two of them helped out.

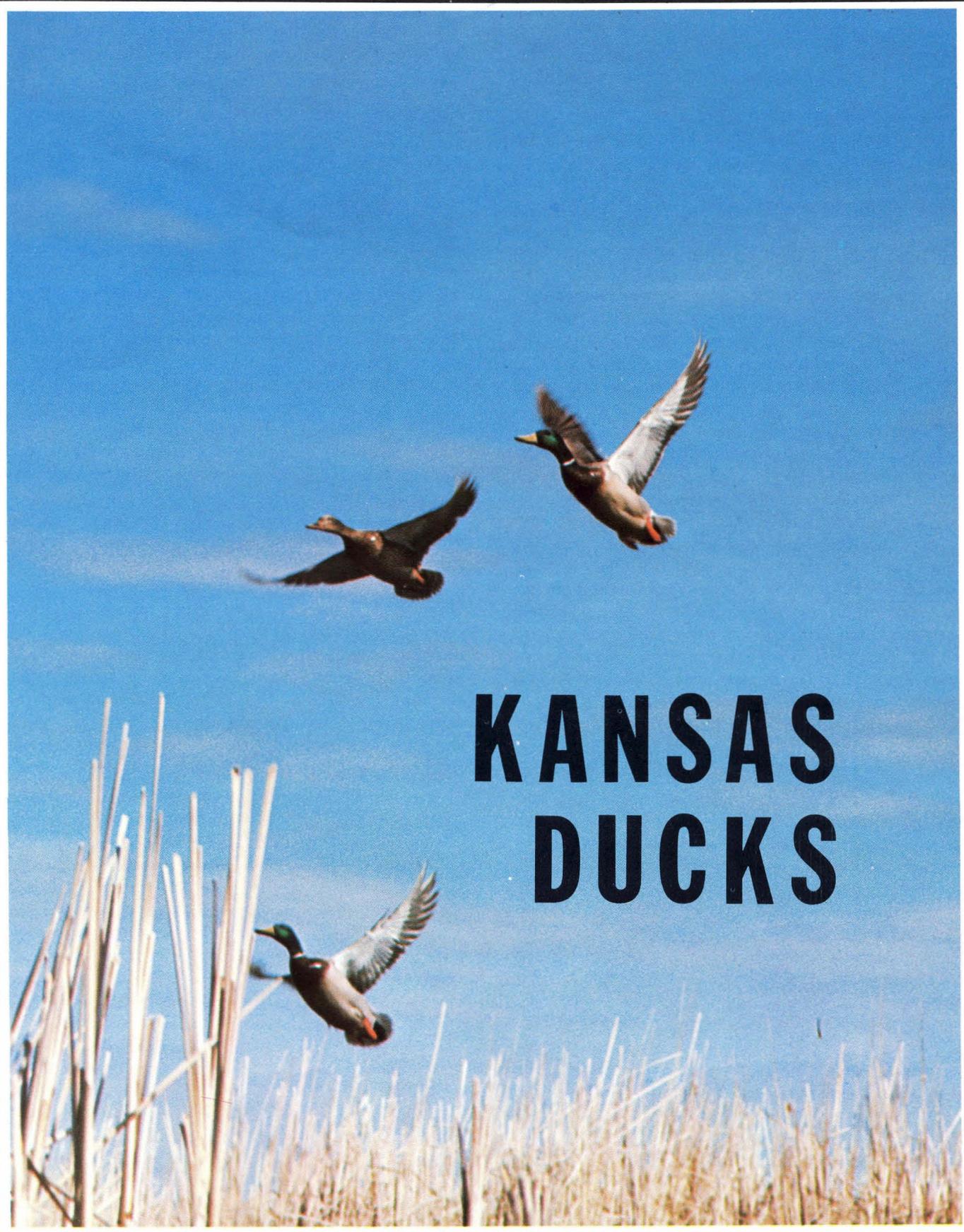
I first saw the farm on a cold opening day about half an hour before sunrise. Glen and his son and I stepped into the cover at 8:00, catching the first roosters in bed around an abandoned farmhouse. Except for our shooting which started out poor and got worse as the morning progressed, we had a good day and came in with our limits at about 2:00. I walked into the farm-

yard behind Glen who was stepping along with more spring than he had any business having. We cased the guns, took off our hunting coats, and went up to the house to thank the brothers. Dinner was waiting. The brothers invited us in and we sat down to a table of fried chicken, roast beef, potatoes and gravy, hot corn, and fresh bread.

After dinner, the sister cleared the table, politely ignoring our offers of help, and we sat in the parlor until dusk talking about where the birds had been, and the fox we had seen by the creek, the deer sign, and the bluebird that had nested in their backyard that summer—the first they had seen in many years. I've thought hard and tried a number of alternatives, but I've never found a better way to end a hunt.

At the time, this kind of relationship between hunters and landowners made sense to me because it was a lot more comfortable than sneaking around the landscape, ready to jump the fence and run for the creek if the farmer showed up. Since then, I've found much better reasons for asking before I hunt. The whole sport has changed in the last thirty years. There are more hunters trying to use the same amount of land, and most of them are from the city now, with no contacts on the land. They have to drive farther in less time to get to the places they used to hunt. They're already pretty well fed up with being told what to do and are anxious to escape city-style regulations. So they trespass. Much of the ground-swell public sentiment against hunting is aimed at this disregard for the rights and safety of other people, and, of all the charges that have been leveled against the sport, this one is the hardest to answer. There is no legitimate argument in favor of breaking the law. We'll either learn to ask to hunt, or we won't hunt.



A photograph of three ducks in flight against a clear blue sky. One duck is in the foreground, flying from left to right, with its wings spread. Two other ducks are flying higher in the background, also with wings spread. The foreground is filled with tall, dry grasses. The entire scene is framed by a white border.

KANSAS DUCKS

THE PAST

Before settlement, water was a surprisingly common element of the Great Plains. The young, recently glaciated face of the northern grasslands from Manitoba and Saskatchewan down through North and South Dakota was pocked with millions of shallow potholes. Farther south beyond the reach of the old glaciers, the gentle topography and deep, sandy soil of the grasslands allowed prairie rivers to spread out into broad, shallow channels braided around shoals and sandbars. Rivers like the Republican, Arkansas, Cimarron, and Platte took their sustenance from the Rockies and flowed strongly out into the flatlands.

Much of the prairie was poorly drained. The Texas panhandle held much of its rainfall in hundreds of broad saucers called playa lakes. The high plains of Kansas had similar rain puddles of various sizes, most of which have been leveled out of existence since the advent of irrigated farming. Large areas around Great Bend, McPherson, and Concordia filled with runoff from surrounding high ground, and the resulting marshes persisted for years when rainfall was normal.

East of the Flint Hills where rainfall was heavier, there were other, more permanent wetlands. Some unknown French explorer was impressed enough with some of them to hang the name “Marais des Cygnes”—marsh of the swans—on a major east Kansas river.

Waterfowl passing from the pothole breeding grounds to wintering marshes on the Gulf coast couldn't have ignored this water. In years when the

clouds were particularly kind to the plains, most of the flyway's ducks and geese probably stopped for a few weeks spring and fall. Early reports from the grasslands seldom commented on waterfowl, probably because immense herds of buffalo and elk attracted the exclusive attention of early travelers. Waterfowl were abundant, however, and provided meat and eggs in many dugouts during the first years of settlement. The commonness and productivity of wetlands on the early plains is reflected in records of early crane and shorebird hunts. The Eskimo curlew, now probably extinct, and the golden plover moved over the tallgrass prairie in huge flocks. One nineteenth century ornithologist made this report from Nebraska: “Hunters would drive out from Omaha and shoot Eskimo curlews . . . until they had literally slaughtered a wagonload of them, the wagons actually filled, and often with the sideboards on them at that.”

During the last third of the nineteenth century, gunning for waterfowl became big business from the Atlantic coast inland to the Mississippi valley. Market gunners killed millions of ducks and shipped them to New York, Chicago, and other major population centers by the freight car load. The impact of market hunting on waterfowl populations in the East was so great that twelve states passed laws against spring shooting as early as the 1870s. In Kansas and most other parts of the Central Flyway, however, market shooting was probably never a major threat to waterfowl numbers. In the 1870s and early 1880s, profes-

Sandhill cranes on Platte River



(Nebraska Game and Parks Comm.)

sional hunters were after bigger game than ducks; the last of the great buffalo herds were being wiped out at about this time. Even if a hunter had taken a notion to market hunt ducks, he would have been hard pressed to find a market. It was a long way from the plains to any city that had a significant demand for wild meat, and there were many prime duck shooting areas closer to the big towns. By the time Kansas transportation and population made waterfowling for the market possible, black times had come upon ducks farther east, and the federal government had passed laws that crippled and later killed the industry, luckily for American waterfowl.

The first of the laws was Senator John Lacey's interstate commerce bill passed in 1900. The bill prohibited interstate shipment of game. The Weeks-McLean Act of 1913 placed migratory birds under the custody and protection of the federal government, and the Migratory Bird Treaty with Canada, ratified by the Senate in 1917, laid the foundation for a broad spectrum of hunting regulations across North America.

These early laws addressed the problem of overharvest, but they did little to protect waterfowl from an even more serious threat—habitat loss. While market hunting was probably not a major source of mortality for Central Flyway ducks, intensive agriculture was. In the eastern tallgrass country, potholds, marshes, and oxbow lakes occupied tremendously fertile corn land. Dragline operations and field tiling began before the turn of the century and accelerated with population growth in the Midwest. In some Midwestern states like Iowa and Wisconsin, more than ninety percent of all wetlands were drained between 1870 and 1970. The trend was the same in the wheat country farther west where drier climate made the elimination of marshland even easier. Census figures for 1929 showed that more than 84 million acres of land in 35 states were touched by drainage projects. This habitat loss was and is most telling in the northern prairie, the breeding stronghold for the entire continent's waterfowl, but drainage of Kansas wetlands accompanied by demands for irrigation water from major rivers was also important since it affected staging areas and wintering grounds.

While the artificial drying out went on, the plains were also in the grip of a long-term natural drought. In Kansas, the toughest years were between 1910 and 1917 and again between 1930 and 1940, but farther north, the below-normal precipitation persisted almost unbroken from 1915 to 1935. By the middle of the Depression, the continental waterfowl population had dropped to about thirty million. Concerned sport hunters pressed hard for measures to reverse the decline in waterfowl numbers. Spurred by the hard times on duck marshes, federal agents took hard-nosed action and brought an end to the last wide-scale flagrant violations of waterfowl regulations at about this time.

In 1921, Dan Anthony, U.S. Congressman from Kansas, sponsored a bill that was to prove one of the

most controversial conservation proposals ever introduced in Congress. It called for federal acquisition of waterfowl refuges across the country to counteract the loss of private wetlands. Anthony and other supporters of the bill fought for eight years through three Congresses until the bill, the Migratory Bird Conservation Act, passed in 1929. Money to get the new refuge program started was hard to come by in the first years of the Depression, and the situation for waterfowl steadily worsened until 1934 when a worried Congress passed the Migratory Bird Hunting Stamp Act—the beginning of the Duck Stamp and source of the cash behind the modern waterfowl refuge system. The money was applied first and most heavily on the nesting grounds in the Dakotas and along the Mississippi and Atlantic Flyways, but, in 1954, the refuge system came to Kansas with a 10,778-acre purchase at Kirwin followed by the 21,000-acre Quivira refuge in 1956 and 18,000-acre Flint Hill refuge in 1966.

The combination of Franklin Roosevelt's liberal influence and the lowest waterfowl populations in memory spurred Congress to pass another law in the 1930s—the Pittman-Robertson Act. Funds derived from this tax on sporting goods and ammunition supported state wildlife research and land acquisition. Three of Kansas' major waterfowl areas, Cheyenne Bottoms, Marais des Cygnes, and Neosho, were partially funded by the Pittman-Robertson tax. In addition to these specific waterfowl management areas, the federal government began a reservoir building program in Kansas that has turned the state into a waterfowl wintering ground.

With this help from the federal government and the return of adequate rain through most of the breeding range, waterfowl bounced back. By 1944, the continental population had rebounded to 120 million. But things have never been quite the same as they were in the days before the plow came to the prairie. The 217 million acres of original wetland in the United States have been reduced to 82 million acres, and three-fourths of the remnant is marshland that has little or no value to ducks. The good times of the early 1950s were followed by another drought that brought the population to an all-time low of 28 million in 1965.

Recently, the U.S. Fish and Wildlife Service contracted for the drilling of six wells to supply water for a duck marsh in southern Nebraska. Local farmers who depend on groundwater for irrigation strenuously objected to the use of "their" water for duck ponds, even though the amount of water involved was negligible compared to agricultural demand. The controversy is an updated version of the same old face-off between men and ducks in the Midwest. Nearly two centuries after our first appearance on the prairie, it remains the single most pressing problem in modern wildlife management, a simple decision on whether we have any land or water to spare for North American waterfowl. Simple, but not easy.

THE CENTRAL FLYWAY

Early approaches to waterfowl management were based on the assumption that ducks were the same wherever they were found. It wasn't until ducks were banded that biologists recognized that ducks from certain parts of Canada migrated over the same general route to the same wintering ground year after year. A Canadian, Jack Miner, was probably the first to band a duck. His waterfowl, carrying bands with quotes from the Scriptures, became famous through the eastern Midwest and first showed that Ontario mallards migrated down the Atlantic coast. Fredrick Lincoln did the first large-scale banding in the United States in 1922. In 1929, he went to work for a forerunner of Ducks Unlimited, the American Wildfowlers, and banded thousands of ducks in South Dakota and Louisiana. As Lincoln received bands from his ducks, he became convinced that waterfowl management would have to be tailored to the different migration routes. Habitat loss and hunting mortality were not spread evenly over the entire continent, and because migrating ducks were traveling specific routes, some populations were being constantly harrassed while others were left almost untouched. In 1935, he suggested that four flyways be established across the United States and that management regulations be tuned to the situations that prevailed in those flyways. The concept was good but adoption was slow, and it was not until 1948 that the system was implemented.

Lincoln proposed an eastern boundary for the Central Flyway that ran along the east edges of North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. He suggested that the west boundary be established along the western borders of Montana, Wyoming, Colorado, and New Mexico. The east boundary still stands; the west edge has been moved east to the Continental Divide. In between, there are 1,115,000 square miles of grass, making the Central Flyway the largest of the four flyways. Studies done since the 1940s have shown that real migration patterns are much more complex than simple north-south movement along the four flyways, but the flyway system has been maintained because it is convenient for administrators and because each flyway has patterns of land use, hunter pressure, and climate that makes it unique.

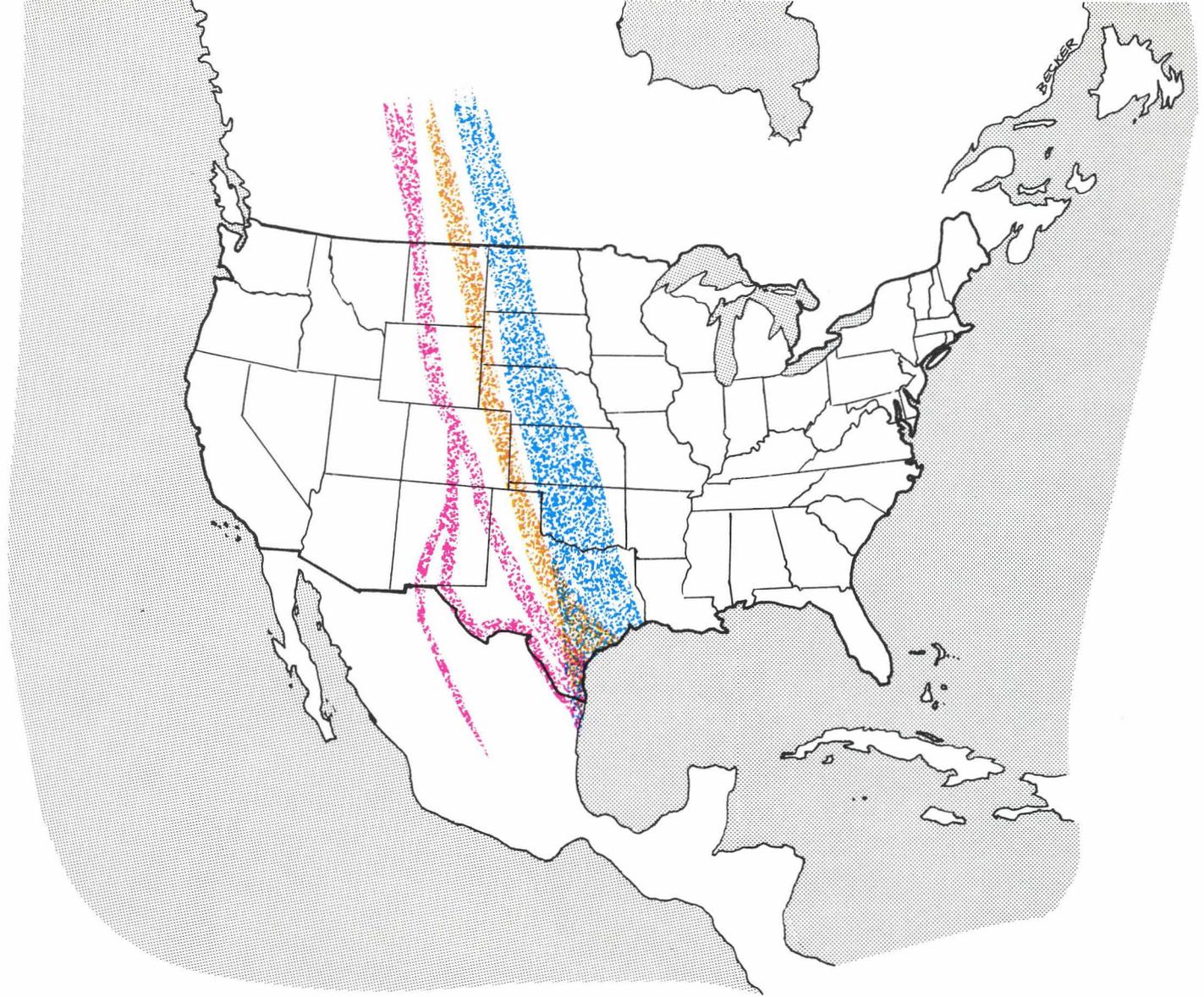
The major wintering areas of the Central Flyway are scattered from Kansas to northern South America. Some of the most important winter marshes are on the Gulf coast from western Louisiana south to the Yucatan peninsula. Some of the flyway's blue-winged teal wander even farther south into Central America, Colombia, Venezuela, Peru, and Guyana. More than 200,000 Central Flyway ducks, mainly pintails, green-

winged teal, shovelers, and canvasbacks stop over on the northern and central highlands of Mexico. Farther north, the playa lakes of the Texas panhandle hold large concentrations of wintering ducks, and the combination of waste grain and open reservoir water in Kansas has made it the leading mallard-wintering state in the flyway.

Most of the top-notch nesting habitat in North America is west of Hudson's Bay in Canada and Alaska. Ducks and geese from all four flyways funnel into this country, the birds from the eastern flyways doglegging to the northwest in spring to breed on the prairies. This compression of the flyways on the nesting ground makes it hard to draw definite flyway boundaries; one pothole may produce Central Flyway ducks while others within a fifty mile radius may be part of the Pacific or Mississippi flyways. Most Central Flyway ducks breed in the pothole country and parklands of Saskatchewan, but appreciable numbers also come from the great arctic and sub-arctic production areas—the deltas of the MacKenzie, Slave, Athabaska, and Saskatchewan rivers. The Yukon delta, Old Crow Flats, and other breeding areas in Alaska also contribute a few birds to the central plains and may be vital back-up areas when drought hits the “duck factories” to the southeast.

The fall routes between the Canadian nesting country and the wintering grounds have been well documented in the years since Lincoln's first banding studies. In addition to the voluminous banding data that have been collected in the last forty years, information on migration has been collected with radar, observations from helicopters and small planes, and radio tracking of transmitters attached to the birds themselves. All this information shows that waterfowl, although generally consistent in their navigation, aren't inflexibly bound to specific routes. Changes in habitat, sudden storms, or the influence of a large flock of waterfowl headed in another direction may cause a duck to change its course. However, according to Frank Bellrose, one of North America's premier waterfowl biologists, these constantly changing specific routes can be lumped into three major corridors in the Central Flyway.

Bellrose's Western Plains Corridor has its roots in eastern Alberta and western Saskatchewan. About 1,500,000 puddle ducks and 70,000 divers leave this nesting area in September or early October and move down the Front Range, through the Texas panhandle where many of them stop, and on into Mexico. Most of them pass to the west of Kansas, though some may spend a few days on the Cimarron River in the extreme



Western plains corridor.



Mid-plains corridor.



Eastern plains corridor.

southwest corner of the state.

The Mid-Plains Corridor begins in western Saskatchewan and slants southeast to the Texas Gulf coast. Bellrose estimates that 850,000 ducks, including 500,000 mallards, migrate along this passage, stopping first at the Fort Peck Reservoir in northcentral Montana, then heading toward the Gulf down a ladder of prairie rivers. The first may be the Yellowstone or the North Platte in eastern Wyoming; farther south, the South Platte, the Republican, the Arkansas, and the Cimarron all beckon to passing waterfowl. Many of the mallards in this corridor winter on the Cimarron or on reservoirs in Kansas, Oklahoma, and northern Texas. Most other species continue to the coast.

The Eastern Plains Corridor picks up most of its birds from central Saskatchewan, eastern Montana, and western South Dakota. Nearly 3,500,000 ducks move down this corridor to eastern Texas and western

Louisiana. The Platte River in central Nebraska is a major staging area along the way; in Kansas, Quivira, Cheyenne Bottoms, Jamestown, and Kirwin refuges are all stopping points.

A fourth corridor along the Missouri River properly belongs to the Mississippi Flyway but includes Marais des Cygnes and Neosho waterfowl areas along with some eastern Kansas' reservoirs. More than 1,700,000 ducks move through this corridor on their way to Squaw Creek National Wildlife Refuge in Missouri and wetlands in eastern Kansas, Arkansas, and western Louisiana.

Unlike these major fall routes, spring migration corridors aren't well mapped. The most important indicators of migration routes, band returns, are hard to come by after the hunting seasons, and there aren't many observer on the marshes when the spring flocks pass through. Scattered bits of information indicate

that spring migration may move along different routes, even different flyways, than they do in the fall. A few pintail bands from the Pacific Flyway have been recovered along the Mississippi Flyway in the spring. Radar observations show that flocks of waterfowl fly northeast in the spring instead of heading due north or northwest along their fall routes.

The migration of the snow goose is probably the best understood of the spring flights. Blues and snows pour south across the eastern prairie and the Great Lakes in the fall, but, when they return from Louisiana the following spring, they funnel into the Missouri River Valley, following it to the Canadian border before they turn northeast toward their breeding grounds.

Why the difference between spring and fall routes? It's hard to say without a specific knowledge of the changes in waterfowl habitat that have occurred over

thousands of years. The instincts and traditions that guide ducks and geese across North America have been forged by centuries of experience and selection. There have been events in the last 10,000 years that may have influenced migration. It hasn't been so long since the plains of New Mexico and Texas were well-watered and supported lush grass and herds of mammoth. In those times, fir and spruce forests grew as far south as southern Wisconsin and parts of Illinois and Iowa. There were glaciers in southern Canada covering some of the pothole country that is now prime nesting habitat. Today's migration routes may still follow old corridors that developed in response to some or all of these situations. Like men, waterfowl are inclined to stick with the old traditions until they're forced to change. And maybe the weary flocks on their way 3,000 miles north just crave a change of scene in the spring.

THE FLIGHT SOUTH

Kansas is about half way down the Central Flyway's eastern tier of states. This area is crossed by some of the major migration routes of both ducks and geese. As the first of September arrives, so does our earliest migrating species, the blue-winged teal. Of the six most common species in the hunter's bag, the bluewings migrate first, peaking about September 9, followed by pintails around the first of October, lesser scaup about October 18, green-winged teal around November 10, and mallards which peak around December 16. Many mallards, Canada geese and snow geese spend the entire winter in Kansas, feeding on waste grain left by modern farming and finding refuge on the open water provided by large reservoirs. During the first week in January, 1978, a record 944,000 mallards were observed in Kansas along with 130,000 geese.

Migration is a poorly understood phenomenon. Obviously, freeze-up on the northern breeding grounds forces waterfowl to move south, and the limited food and cover on the southern wintering grounds make it necessary for them to move north again as soon as possible in the spring. What isn't understood is why many species migrate before food supplies become a limiting factor. It appears that these early flights are

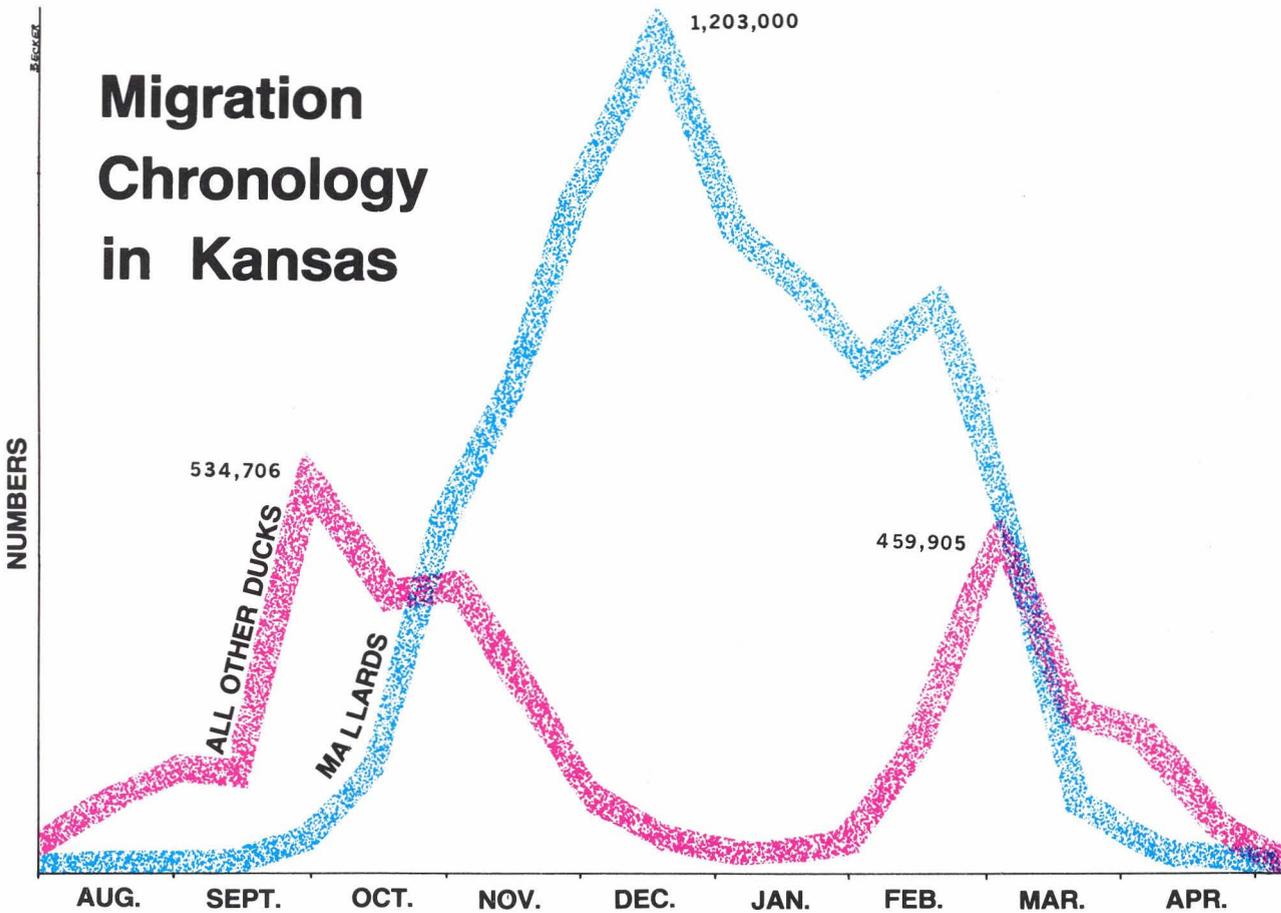
programmed into the endocrine system, having developed eons ago when food shortages necessitated migration. The length of night in comparison to day length (photoperiod) triggers physiological changes such as deposition of fat. Fat is important because of its high energy content, which is needed for the long flight. Finally, weather conditions such as strong favorable winds and falling temperatures may trigger the actual departure.

Waterfowl, like many other birds, often return to the same breeding and wintering areas year after year. The methods by which they accomplish this feat have been the focus of numerous studies. Four factors were found to be important to waterfowl in navigating from one area to another; landmarks on the ground, position of the sun, star patterns and the earth's magnetic field are used in varying degrees by different waterfowl species. The methods used by any one species are influenced by varying circumstances such as weather conditions.

The mallard is the major duck species migrating through and spending time in Kansas. This is shown in the hunter's bag, where mallards comprise approximately 41 percent of the duck harvest. Although pintails have the second highest population peak (200,000



Frank Heidelberg



birds), the short duration of their stay plus their wariness causes them to rank fourth in the bag, behind mallard, green-winged teal (18 percent of harvest) and blue-winged teal (9 percent). Gadwall rank fifth in the bag, making up 6 percent of the harvest.

Over the past five years, Kansans have harvested approximately 434,000 ducks and 35,000 geese per year. This has increased considerably since the early 60's, when the yearly waterfowl harvest totaled about 130,000 ducks and 10,000 geese.

In recent years, Kansas waterfowl hunters have spent about 7.5 days per year hunting ducks with a success rate of slightly more than one duck per day hunted. Goose hunters have a lower success rate, taking about four days of hunting effort to bag one goose.

Waterfowl, like most small game populations, have a high annual mortality rate. It has been found that about half of all legally huntable ducks die every year, with hunters taking about half of those that die.

According to band analyses, many species of ducks have a first year mortality rate of 60 to 70 percent, and

an adult mortality rate of 35 to 40 percent annually. The reason for the higher mortality among immature birds is their greater vulnerability to the hunter. It has also been noted that females have a higher mortality rate than males. In this case it is non-hunting mortality, largely occurring during the nesting and brood-rearing period, which accounts for the difference.

Certain species have a higher hunting mortality than others because of their availability during the hunting season or their table quality. Examples are mallards and blue-winged teal. Adult mallards have a band recovery rate (bands returned per 100 banded birds) of about 4.7 percent, while adult blue-winged teal have a recovery rate of about 0.9 percent.

Considering the entire continental breeding population, approximately 80 million ducks are available for the hunting season. Hunters will bag about 14.5 million annually. Adding the standard figure of 20 percent for crippling loss, hunters will directly remove about 20 million ducks. Disease, predation, and accidents account for another 20 million. Disease is the largest single cause of non-hunting deaths.

MANAGEMENT

There can be little doubt that the diverse group of gamebirds that we collectively refer to as waterfowl are our most intensively managed wildlife. Most are migratory birds; regulations and management practices that affect their population numbers must extend beyond our state and include other agencies.

In an attempt to transcend state borders, the ten Central Flyway states have joined administratively and formed the Central Flyway Council. The directors of the state fish and game agencies of the flyway states, or their designated representatives, constitute the official voting members of the Council. Delegates from the Canadian provinces participate in council activities, but do not vote on recommendations for regulations in the United States.

The Central Flyway Council meets each year in March in conjunction with the North American Wildlife Conference and again early in August to transact flyway business and make recommendations for changes in hunting regulations and bag limits to the U.S. Fish and Wildlife Service. The council provides an excellent forum for communication and understanding the problems throughout the flyway and attacking these problems in a cooperative, scientific way.

The working adjunct of the Council is its Technical Committee composed of a waterfowl technician from each state. This group meets twice a year in March and August, just ahead of the Council meetings to transact business, coordinate joint waterfowl research or man-

agement work, and to review recent survey and population data needed to formulate harvest recommendations for consideration by the Flyway Council members.

Much of the information needed for the management of waterfowl is continuously being obtained through banding efforts, planned, coordinated and initiated through the joint efforts of the Technical Committee, Flyway Council and the U.S. Fish and Wildlife Service.

The joint efforts of the technical committee have yielded results such as the special teal season, publication of waterfowl identification guides, (which are available from the Fish and Game Commission), and the delineation and description of Canada goose populations in the Central Flyway. Mallard banding was done during the 1960s to justify the creation of the High Plains Mallard Management Unit.

The most common use of banding data is to determine the relationship between waterfowl breeding, migrating and wintering areas and where the birds are harvested. This knowledge of the location and movement of our waterfowl populations is a vital tool in their management. Banding data are also used to estimate the percent of the population killed by hunting and the loss to all causes of death during the year.

A minimum of five surveys are conducted cooperatively by states in the council. These include the December coordinated Canada goose survey, the Mid-

the YELLOW Pages

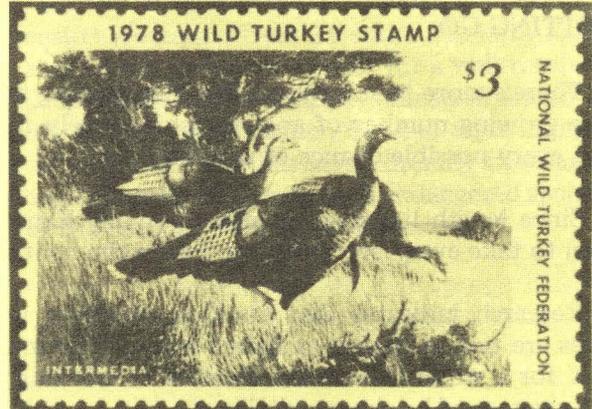
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RIO GRANDES SYMBOLIZE TURKEY FEDERATION EFFORTS

Richard Amundsen's striking painting of a trio of Rio Grande wild turkeys bested a field of 138 entries to win the 1978 Wild Turkey Stamp competition recently at the National Wild Turkey Federation's Annual Convention in Kansas City.

Amundsen's design, entitled "Spirits of Big Bend", has been reproduced on this year's \$3 wild turkey stamp, purchased voluntarily by turkey hunters, philatelists, collectors, and conservationists. Revenues from the stamp are used for education, restoration, or toward the lease, purchase, or maintenance of wild turkey habitat under a unique Wild Turkey Trust Fund administered by the 35,000-member nonprofit organization.



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In addition to the limited stamp issue (50,000 printed), a signed and numbered edition of prints (6½" x 9") has been produced and will be available through most reputable wildlife art dealers.

Priorities for this year's funds include a full-time wildlife biologist assigned to the problem of excessive clearcutting; wild turkey research grants to the University of Minnesota, Auburn University, and the University of Arkansas; distribution of 2,000 trap-transfer boxes for restoration purposes; and the printing of a free booklet entitled "The Status, Management and Future of the Wild Turkey".

Wild turkey stamps are tax deductible and available from the National Wild Turkey Federation, Edgefield, South Carolina 29824. Cost of the stamps is: 1976-\$4 each, \$40 per sheet; 1977-\$3 each, \$30 per sheet; 1978-\$3 each, \$30 per sheet.

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KIRWIN REFUGE AMONG TOP WILDLIFE ATTRACTIONS

How popular are wildlife refuges?

Besides the wild critters that visit and live there, millions of visitors annually trek to refuges in the Rocky Mountains-Great Plains Region, according to the U.S. Fish and Wildlife Service.

Officials estimate Kirwin National Wildlife Refuge, one of three federally-administered wildlife areas in Kansas, draws more than 100,000 users each year. Other refuges which attract a similar number of wildlife enthusiasts each year are Mingo and Swan Lake, both in Missouri; the National Bison Range in western Montana; and Devils Lake in North Dakota. Three other refuges in the region account for more than a million visitors annually, federal officials claim. Those three top attractions are National Elk Refuge at Jackson, Wyoming; DeSoto National Wildlife Refuge in Iowa northeast of Omaha, Nebraska; and the sprawling 921,617-acre Charles M. Russell Wildlife Range headquartered at Lewiston, Montana.

(Continued)

There are 40 major national wildlife refuges in the 10-state region that includes Kansas, Colorado, Utah, North and South Dakota, Nebraska, Iowa, Missouri, Wyoming, and Montana. Visitor activities range from bird and other wildlife watching and hunting to photography, fishing, and environmental education programs.

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LETTING GO

There's more to releasing a fish than ripping the hook from its mouth and lobbing it back into the water. The growing number of anglers fishing solely for sport could tell you how important it is to give returned fish every possible chance of survival.

Since length limits are in effect at many Kansas lakes and reservoirs, it is especially important for fishermen to take every precaution to insure the continued survival of returned fish.

Research indicates that hooking mortality varies according to bait or lure types. Generally, flies and lures are not as deadly as baited hooks. The main reason is that bait fishermen allow fish to chew on the bait for a while to increase chances of hooking the fish. That allows fish to swallow the bait, increasing the chances of hooking a vital part.

But there are methods of releasing even deeply-hooked fish to increase their chances for survival. If a fish swallows a hook so that even needle-nosed pliers don't work to extract the hook, the best release technique is to cut the line as close to the hook as possible. The fish's digestive juices will eventually dissolve it.

Fish also undergo drastic physiological stress when they are being played. Although the tug at the other end of the line is the chief pleasure of fishing, it's best not to work a fish to exhaustion. If the fish is gasping for breath when he's pulled alongside the boat, chances are it won't survive even if the gentlest of techniques are applied to release it.

So, fish returned to the water will grow older and bigger if a few simple rules are applied:

- Keep the fish in the water as much as possible while handling it and removing the hook.
- Remove the hook gently and do not squeeze the fish or put your fingers in its gills.
- If deeply hooked, don't pull the hook out; cut the line as close to the hook as possible.
- Play the fish as rapidly as possible and avoid playing it to total exhaustion.
- If the fish is disoriented after its return to the water, hold it gently as you move it backward and forward in the water to revive it.

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KANSAS WILDLIFER EARNS AMERICAN MOTORS AWARD

A Kansan is among the 22 persons in the U.S. to receive American Motors Conservation Awards for 1978.

F. Robert Henderson, wildlife damage control specialist for the Kansas State Wildlife Extension Service, received the honor for his involvement in conservation programs in Kansas.

(Continued)

“With our awards program, which recognizes contributions of dedicated citizen and professional conservationists who do not seek recognition and who are not generally in the public eye, we hope to focus attention on the need for proper management of the nation’s renewable natural resources, and on what people can do to help meet this need,” said Roy Chapin, Jr., chairman of American Motors Corp.

Awards program coordinators paid tribute to specific accomplishments by Henderson with these words:

“Because of the depth of his influence and leadership, a new understanding of principles of wildlife management and damage control has emerged in Kansas. He was instrumental in organizing an Animal Damage Control Workshop, which involves exchange of extension specialists from 18 states. His knowledge of wildlife has been utilized by Congressional committees, and he was technical advisor for a well-received Environmental Protection Agency film on coyotes. He is deeply involved in wildlife education aimed at both youth and adults, and developed the ‘Acres for Wildlife’ 4-H program, which has had wide impact. He started the first class in ecology for high school students in Kansas, and has given literally thousands of talks and radio and TV presentations on wildlife management, hunter education, and endangered species—including the rare black-footed ferret, on which he is one of the country’s top authorities.”

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NEW WILDLIFE BOOK AVAILABLE

The Wildlife Management Institute has published a new 32-page book that describes basic principles of wildlife management.

“Helping Wildlife: Working With Nature,” by Delwin E. Benson, extension wildlife specialist at Colorado State University, is especially suitable for use by teachers and young people. The book costs \$1 and may be ordered from the Wildlife Management Institute, 1000 Vermont Avenue NW, 709 Wire Bldg., Washington, D.C. 20005. Orders of 2,000 or more copies may receive a bulk discount rate, and sponsors’ names and logos can be printed on the front cover at no additional cost.

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AIR GUNS: THE KID’S TOY GROWS UP

For most members of today’s shooting fraternity, that first “BB gun” was the answer to a multitude of childhood dreams involving shooting and hunting. It played a part in countless adventurous pursuits and was often a teaching tool with which the basics of rifle safety and marksmanship were learned. Later, the BB gun led to that first .22, which opened new worlds of shooting pleasure.

And that was the end of the BB gun, as far as its ever being used for serious practice again. However, in recent years, the leading U.S. air gun manufacturers have done much to dispel the “kid’s toy” image traditionally associated with air guns. New models featuring increased power, excellent accuracy and many technological advances have made air guns attractive to a large number of adult shooters.

The low noise level, inexpensive operating cost and target-grade accuracy of the new generation of non-powder-burning guns make them a great practice medium to keep your shooting skills sharp. Indoor ranges enable you to practice even when the weather makes outdoor shooting miserable if not impossible. Several companies offer sturdy BB and pellet traps which make it easy to set up a safe indoor range in your den or basement.

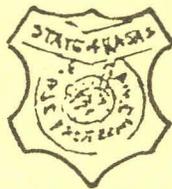
Of course, outdoor plinking and target uses are virtually unlimited as long as a safe backstop is present. The leading companies offer scopes and mounts to take better advantage of the long-range accuracy of the

(Continued)

new air gun lines—many of the rifles will punch one ragged hole in a target at 30 feet, and 25-yard groups may well run under an inch. Since velocities of the more powerful models may exceed 700 feet per second, they are definitely not toys, and all safety precautions you would take with a true firearm must be observed.

However, the use of these guns for hunting should never be attempted. A bit of figuring with a ballistics table and calculator reveals that even the most powerful air guns produce a muzzle energy of only 15-20 pounds, far less than the 130 foot-pound figure typical of a .22 long rifle ammo.

Any way you look at it, air guns now offer an interesting and inexpensive practice alternative for adult shooters. The next time you stop at your dealer's store, look over the new air gun products. The old friends are still there, but chances are you won't recognize a lot of them. The kid's toy has grown up. (Reprinted courtesy National Shooting Sports Foundation)



It's The Law.

It's not just humiliating and expensive to violate a fish and game law. It's bad business.

Fishing without a license, for example, is one violation game protectors encounter frequently, especially in spring and summer. A resident fishing license costs \$5; but, fishing without a license can easily cost the offender four or five times the cost of the license itself. That's bad business for all involved, especially the offender who pays the fine, sours on fishing trips, and still doesn't have a fishing license.

And there are other violations that can be much more costly.

Consider these:

—A Junction City man, Richard Royal III, paid a total of \$190 in fines and court costs on charges of shooting at a pheasant from a vehicle, hunting from a public road without permission of adjacent landowner, and hunting a game bird during closed season.

—James Hemmert, Garden City, was fined \$100 plus court costs in Finney County District Court for possessing a pheasant during closed season.

—Mark Fornshell, Wichita, paid a total of \$60 to the court which assessed him guilty of attempting to take a duck out of season.

—Terry L. Maupin, Paola, was assessed a \$35 fine plus court costs on a charge of shooting a protected bird (a cardinal).

The examples go on and on. So will the work of our game protectors until those tempted to step outside the law realize that violating the law is trouble nobody needs.

LEGISLATIVE SUMMARY

Abiding by the law is infinitely easier if one knows what laws are in effect. The Kansas Legislature this year passed several laws pertaining to outdoor sports and the operation of the Fish & Game Commission. Those provisions are summarized below.

Among new laws to take effect July 1, 1978 are the following:

- Hunting licenses are required for both residents and nonresidents when hunting coyotes. Also, a trapping license is required for residents when trapping coyotes.
- Hunting or pursuing wild animals or birds from an aircraft is prohibited.
- Free fishing privileges are available to prison inmates while in honor camps and to residents under 21 years of age residing in institutions operated by Social and Rehabilitation Services.
- Hunting, fishing, and trapping privileges are available to any resident of at least one-sixteenth Indian blood, who is enrolled as an American Indian on a tribal membership roll maintained by the Bureau of Indian Affairs or who has been issued a certificate of degree of Indian blood by the Bureau of Indian Affairs. The Commission will issue, free of charge, a permanent license to persons with those qualifications. Exemption from paying the big game permit fee has been deleted, requiring Indians to pay the same fee as other big game permit applicants.
- The Commission is authorized to establish fees, within a statutory framework, for 27 licenses and permits available from the Commission. However, any fee change resulting from regulatory action would not be effective until January 1, 1979.

Among the new laws to take effect January 1, 1979 are these:

- The Commission is authorized to issue a two-day non-resident fishing license for a fee not to exceed \$3.
- Persons having lost or destroyed a valid license may, by making oath to that fact before the issuer of the license, obtain a duplicate. Formerly, the law required that oath to be made only before the county clerk.

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FRIENDS OF ANIMALS SUIT DISMISSED

Last month's FISH & GAME editorial considered a recent suit filed against the U.S. Fish and Wildlife Service to stop distribution of Pittman-Robertson funds to state conservation commissions. The suit was a transparent attempt by the Friends of Animals and Committee for Humane Legislation to deal a crippling blow to sport hunting without any consideration for the millions of wild critters that continue to benefit from the P-R aid program.

Judge Charles Richey of the Washington, D.C., District Court recently dismissed the suit after the Fish and Wildlife Service agreed to a settlement. According to the settlement, FWS agreed to publish a draft environmental impact statement on the P-R program by July 1, an action the service had already planned and prepared for. They also agreed to hold a public meeting in Washington on the draft statement, another course of action they had already planned. In addition, they will make arrangements to provide a computer listing of all P-R projects and will designate a place in Washington where environmental assessment of current projects can be reviewed by the public.

(Continued)

Sportsmen can expect to see more of these legal maneuvers from the protectionists, but they have lost the element of surprise and will probably have little effect as long as dedicated wildlife groups continue to recognize the importance of hunting in North American wildlife management.

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KANSAS WILDLIFE COMES TO TELEVISION

Beginning in late August, the Fish & Game Commission will present a series of outdoor programs on Kansas public television. Channel 8 of Wichita has agreed to cooperate in production and broadcasting the series which will take an in-depth look at a variety of wildlife in the state and some of the problems that confront them. Negotiations are under way for other stations to air the episodes so all Kansans can view them.

George Anderson, an experienced hunter, fisherman, and former game protector for the Commission, will host the programs. Planned topics include striped bass (hottest new fish in Kansas), waterfowl and the lead shot controversy, bowhunting for beginners, the comeback of wild turkey in Kansas, and many other captivating stories.

Look for the program schedule in most major Sunday newspaper TV supplements, in the public television program schedule for members, and in coming issues of this magazine.

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WILDLIFE RESTORATION MEASURE ADVANCES

A new bill, which would levy an 11 percent manufacturers' excise tax on components of handloaded ammunition, has passed one hurdle in the U.S. House of Representatives, according to the Wildlife Management Institute.

The "component parts tax bill" has been reported favorably from the House Committee on Merchant Marine and Fisheries and now must be scheduled for floor action by the House Rules Committee. Proceeds from the tax would be earmarked for the Federal Aid in Wildlife Restoration Program. Of the estimated \$6 million in collections, about \$1 million would be invested in wildlife restoration and \$5 million in outdoor education and shooting range programs by state agencies.

Action by the Senate on its identical components bill has apparently stalled, due largely to a lobbying effort by antihunting and antigun groups.

"It is unfortunate that the gun question was raised in that it has absolutely nothing to do with the merits of the components bill," said Institute spokesman Lonnie Williamson.

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1978 EARLY SPORTSMAN'S CALENDAR

SEASON	OPENING DATE	CLOSING DATE	BAG LIMIT	POSS. LIMIT
Rabbit, Cottontail	Season Open Year Around		10	20
Rabbit, Jack	Season Open Year Around		No bag or poss. limit	
Squirrel	June 1	December 31	5	10
Bullfrog	July 1	September 30	8	No poss. limit
Furbearer running (raccoon, opossum, foxes only)	July 15 Feb. 1, 1979	October 20 March 15, 1979	May not be killed or taken	
Furbearer hunting (no hunting allowed for mink, muskrat, beaver - striped skunk open year around)	November 15	December 31	No bag or poss. limit	
Furbearer trapping (badger, bobcat, red & gray fox, opossum, raccoon, striped skunk)	November 15	December 31	No bag or poss. limit**	
Furbearer trapping (mink & muskrat)	December 15	February 28, 1979	No bag or poss. limit**	
Beaver trapping	January 1, 1979	February 28, 1979	No bag or poss. limit**	
Mourning Dove	To be set late July			
Teal	To be set late July			
Rail, Sora & Virginia	To be set late July			
Snipe, Common	To be set late July			
Woodcock	To be set late July			
Geese	To be set late July			
Ducks	To be set late July			
Pheasant	November 11	To be set Aug. 29-30		
Quail	November 11	To be set Aug. 29-30		
Quail (west of US 81 & north of I-70)	November 18	To be set Aug. 29-30		
Prairie Chicken	November 4	To be set Aug. 29-30		
Antelope (archery)	September 30	October 4	1*	1*
Antelope (Firearms)	October 7	October 9	1*	1*
Deer (Archery)	October 1 December 16	November 30 December 31	1*	1*
Deer (Firearms)	December 2	December 10	1*	1*

*Special Permit Required

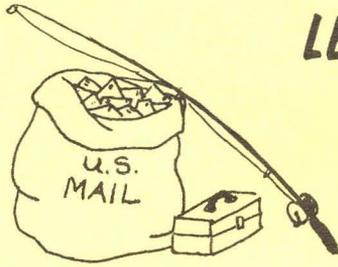
** Trapper limited to 20 traps
for all species

BIG GAME PERMIT APPLICATION PERIODS

Deer (Archery) — June 1 through June 21
 Deer (Firearms) — July 1 through July 17
 Antelope — June 10 through June 26
 Turkey — January 15 through February 5, 1979

DRAWING DATES FOR SUCCESSFUL APPLICANTS

Deer (Firearms) — July 26
 Antelope — July 5
 Turkey — 1st Wednesday in March, 1978



LETTERS to the EDITOR

instructor since 1974, is a Kansas City resident.

Starting with this issue, space will be reserved in the magazine for you to comment, raise questions, offer advice, air complaints, or otherwise express your feelings. All we ask is that you keep your comments as brief as possible. We will occasionally edit letters because of space limitations.

Dear Readers:

Have something you want to share with other readers of KANSAS FISH & GAME?

Young Scott Lee did, relating some kind words about the hunter safety program coordinated by Fish & Game, and his instructor, Dennis Wilson. Wilson, a hunter safety

Letters should be mailed to: Editor, Kansas Fish & Game, R.R. 2, Box 54A, Pratt, KS 67124. We'll appreciate hearing from you.

EDITOR

Dear Sir,

My name is Scott Lee. I'm 12 years old. I took your Hunters Ethics Course in 1976. It has helped me a lot. A few days ago I had an accident and was run over by a riding lawn mower. I cut my leg and the first aid part of the course really helped when I was in pain. The first thing I thought of was to stop the bleeding with a tourniquet. I stayed calm and the ambulance brought me to the hospital. I'll be on crutches for a while but I'm fine.

I would like to thank Mr. Dennis E. Wilson who was my instructor.

Sincerely,

Scott A. Lee
10625 West 57 Street
Shawnee Kansas 66203

winter Duck Survey, the Spring (March) White-Fronted Goose Survey, the May Breeding Pair Survey and the July Production Survey.

All states in the flyway also assist in an annual wing bee. Each year waterfowl wings are collected from hunters in all states of the Central Flyway. After the collection period, biologists from these states gather in a cooperative effort to "read" these wings. Species, sex, and age of a duck can be determined by examining its wing plumage. Valuable information concerning species composition of the harvest, age structure of waterfowl population and distribution and timing of the harvest is obtained. These data are necessary for the proper management of waterfowl populations through manipulation of harvest regulations.

Hunting regulations in all flyways are designed to limit harvest to the annual surplus of each species. The surplus is that portion of the population in excess of what is needed to maintain the breeding population at some pre-determined level. This pre-determined level may be based on factors such as available breeding grounds or crop depredation problems on the breeding or staging areas. Allowing the maximum harvest without reducing the breeding population is a difficult task. Information such as the biology of each species, population size, productivity, vulnerability to hunting and the projected effect of different types of hunting regulations must be considered.

Several types of regulations are used to control the harvest, mainly bag limits, season length, opening and closing dates, restrictions on place of hunting and on species which may be hunted.

Besides limiting the harvest, regulations distribute recreational opportunities more evenly over North America. The flyways usually have different regulations based on regional variations in hunting pressure and migration patterns of the waterfowl. Generally, as the proportion of birds harvested increases, the regulations become more restrictive. Within flyways, management zones like the High Plains Mallard Management Unit may be established in order to obtain optimum benefits from certain populations. The High Plains Mallard Management Unit extends from Canada to Mexico and allows a longer season on that mallard population shown to be capable of withstanding additional harvest.

Special species regulations are also used, usually to increase the harvest of a certain species. One example of this sort of special regulation, the special teal season in September, is primarily aimed at the blue-winged teal which has a low harvest rate and migrates south earlier than other ducks. Other teal are included because they mix with and are difficult to distinguish from bluewings.

The point system has become a popular method to manage the harvest. Under this system, the daily limit is reached when the point value of the last bird taken,

added to the sum of the point value of the other birds already taken that day, reaches or exceeds the allowable point total, usually 100. By adjusting the point values up or down, hunting pressure can be directed away or toward a particular species, depending on its status at that time. The results of a study undertaken in 1974 indicated that through the point system, harvest of drake mallards was increased as much as 20 percent and that of female mallards decreased as much as 31 percent from what was expected under conventional regulations. In general, the point system, appears to be effective in directing pressure from hen to drake mallards in areas where mallards constitute a major portion of the harvest. The effectiveness of the point system as a management tool hinges on the ability of the hunters to identify ducks and to cooperate with conservation agencies and abide by the law.

The basic responsibility for the management of waterfowl rests with the Federal Government and was delegated to the U.S. Fish and Wildlife Service by passage of the Weeks-McLean law in 1913. This law stated that migratory birds were deemed to be within the custody and protection of the Government of the United States and that they shall not be destroyed or

Drake lesser scaup

Frank Heidelbergbauer



taken contrary to regulations provided.

Treaties with Canada and Mexico have been ratified and in part state, "The closed season on migratory game birds shall be between March 10 and September 1. . . . The season for hunting shall be further restricted to such period not exceeding three and one half months."

The process of modifying and formulating annual hunting regulations is nearly continuous. Soon after the close of the annual hunting season, early in the year, basic regulation changes that are not dependent on spring and summer surveys are considered by the U.S. Fish and Wildlife Service. Desirable changes are proposed and transmitted to state Flyway Councils—

comprised of the Director of the official State Wildlife Agencies—and published in the Federal Register. State Flyway Councils turn the proposed changes over to their respective Technical Committees for recommendations and prepare a response to the Fish and Wildlife Service no later than April 30. The Fish and Wildlife Service then makes the final decision and publishes the “basic regulations” in the Federal Register by June 1.

As the basic regulations are prepared and reviewed by administrators, field personnel continue to monitor the status of waterfowl populations. The U.S. Fish and Wildlife Regulations Committee reviews this population and production information and develops regulation proposals including length of seasons and bag limit restrictions. These proposed regulations are submitted to the Central Flyway Council and Technical Committee members for consideration in late July.

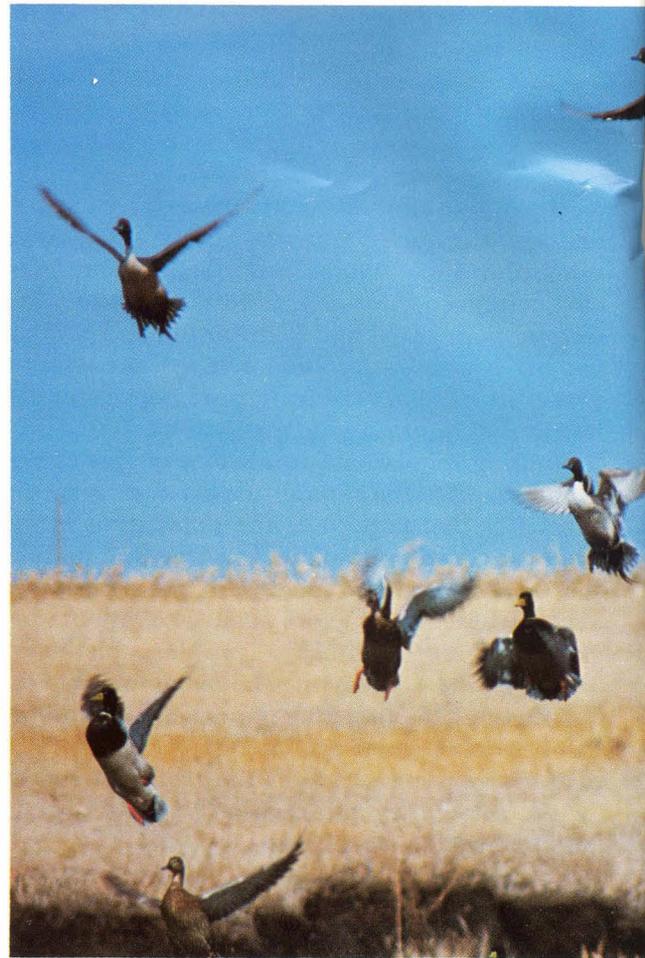
The Central Flyway Technical Committee reviews the proposed regulations and prepares recommendations for the Central Flyway Council, which in turn develops recommended changes for consideration by the U.S. Fish and Wildlife Service in their final deliberations immediately following the Council meetings. Final regulation decisions are reached in late August and published in the Federal Register. This includes shooting hours, length of season, season framework dates and daily bag limit restrictions.

These Federal Regulations are transmitted to Kansas. From this point on, the state’s role in the establishment of waterfowl regulations is that of an implementor. The Kansas Fish and Game Commission, in an open public meeting, chooses specific season dates within the time framework offered and makes decisions concerning other options, such as split or straight season and conventional or point system daily bag limits. In these final deliberations, state administrators may establish additional, more restrictive regulations but they may not in any way liberalize. In making these decisions, the state uses information on waterfowl migration patterns and chronology, species vulnerability, freeze-up dates, distribution of hunter pressure, and hunter preferences. Regulations are set to offer maximum hunting opportunity to the greatest number of people at a time that will be most productive, and, even more important, to protect and maintain the waterfowl resource.

In Kansas, decisions concerning split or straight seasons and conventional or point system bag limits are the easiest to make, while selecting opening and closing dates create the most controversy.

Since 1966, Kansas has chosen to split the season in all years except 1968. There are several reasons for taking this option. Basically, a large number of Kansas waterfowl hunters hunt ponds and shallow marshes. For them, the season is over when freeze-up occurs. At the other end of the spectrum are an increasing number of persons who prefer to hunt reservoirs and the wintering mallards associated with these areas. In addi-

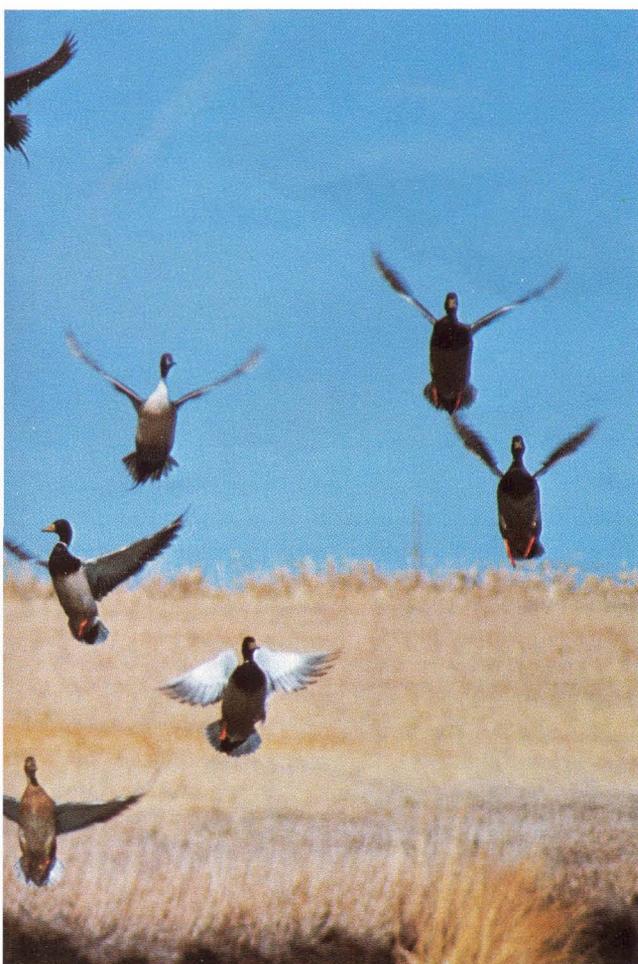
Mallards and pintails



tion, there are two migration peaks in the state, one for mallards in late December, the other for all other species sometime in October. Peak migration dates also vary across the state. By choosing the split season, we strive to allow all hunters an opportunity for a successful hunt, to increase the harvest of those species capable of withstanding additional harvest and in some years to limit the kill of certain species, such as redhead, by closure during their peak migration period.

In choosing the opening and closing dates, we simply attempt to schedule the season to maximize the benefits for the greatest number of sportsmen. This is the most controversial decision because of the differences in weather and migration peaks from one section of the state to another and the varying preference of hunters themselves.

Kansas has chosen the point system every year since 1972. Besides being a method to manage individual species, this system has other advantages over the “conventional bag” regulation. Most important, the hunter doesn’t have to identify a duck on the wing before making the decision to shoot. Each bird bagged can be identified at leisure (with the help of a bird book



Frank Heidelbauer

if necessary) to determine whether or not another bird may be taken. The hunter who can identify birds on the wing enjoys both the added challenge of picking low-point targets and the opportunity to shoot more birds than could be offered under a uniform bag limit.

STEEL SHOT

For the first time in 1978, Central Flyway hunters will see a new regulation restricting the use of lead shot. Evidence gathered by the U.S. Fish and Wildlife Service indicates that lead poisoning may be the most common disease in waterfowl. This poisoning occurs when waterfowl ingest spent lead shot during normal feeding activities. The shot is dissolved by gastric juices and the grinding action of the duck's gizzard, and is absorbed and transported within the body with toxic results.

Lead poisoning has been recognized as a waterfowl mortality factor since 1894. In subsequent years, conservationists became increasingly concerned about this problem, and, in the 1950's, Frank Bellrose and others at the Illinois Natural History Survey undertook a comprehensive study of the problem. At the conclusion of their study, Bellrose estimated that two to three

percent of the fall population of ducks in the United States die each year due to lead poisoning. This annual lead poisoning loss approaches the total average annual hunter harvest of ducks in the entire Central Flyway. Most of these deaths go unobserved.

The amount of shooting over an area, bottom composition, depth of water, food habits and siltation rates all influence the availability of lead shot to feeding birds. The mortality rate of waterfowl which ingest shot is also dependent on several factors, with diet and climatic stress being two of the major determining influences. Diets of whole grain such as corn tend to increase the negative effects of ingested lead shot while diets of aquatic plants tend to decrease the effects.

Most lead poisoning occurs after the hunting season, when hunter activity no longer discourages waterfowl use of the area. At this time, ducks resume their natural feeding habits in the hunted area and consume shot at a much higher rate. Lead poisoning is a lingering, chronic sickness. Poisoned birds, if not eaten by predators, seek the security of dense vegetation and die unnoticed. The loss of waterfowl in late winter and early spring, after the hunting season, has relatively more impact on the next year's breeding population than mortality occurring in summer and fall.

Because of the lead poisoning problem, efforts were initiated to find a non-toxic substitute for lead shot. So far, soft steel is the only practical substitute that has been found, although research on the problem continues.

Over the past several years, the pros and cons of steel shot have been discussed and written about numerous times. Basically, two questions are uppermost in hunters' minds—the possibility of increased crippling due to the fact that steel is less dense than lead and the question of shotgun barrel damage.

Controlled field tests have shown that there is little difference in the killing efficiency of standard 1¼ oz. lead shot waterfowl loads and 1½ oz. steel shot loads at ranges of less than 40 yards. These tests showed that, while more ducks might be unretrieved when steel shot is used, the difference is so slight that it is not statistically significant.

There are several compensatory factors which tend to override the effects of steel shot's light weight. It is possible to compensate for a difference in density by increasing the size of steel pellets—a number 4 steel pellet corresponds roughly in weight to a number 6 lead pellet. Also, since steel pellets are harder than lead pellets, there is much less deformation when they are fired, resulting in a much higher proportion of pellets within the shot pattern.

The use of a protective liner to enclose the shot column in modern shot shells eliminates barrel scratching. Tests conducted by the arms and ammunition industry indicate that modern, American-made, single-barreled shotguns of good quality had little or no choke expansion. In some instances, the pattern

densities actually improved slightly. Guns with modified or improved cylinder chokes had less expansion than those with full chokes. Although some double-barreled guns were not affected by shooting steel shot, others, especially those with very thin barrels, did have choke expansion and barrel separation and are not recommended for hunting with steel shot.

At the present time, selected areas with high waterfowl harvest have been designated as steel shot areas in Kansas. Persons should check to determine specific shot-shell regulations for the particular area they plan to hunt.

In recent years, the sport of waterfowl hunting has come under annual attack from anti-hunting groups. The system of formulating regulations has met these challenges and stood the test well. The constant checks, cross checks and corrections of the biological and sociological data have ensured that the final product of our regulatory process is sound and well-founded. The formulation of our waterfowl regulations is a long and tedious process, but it is a process which insures the future of our waterfowl resource and the waterfowl hunting tradition.

HABITAT

Cooperative research, population surveys, and regulations alone, however, aren't enough to guarantee the future of waterfowl as long as their habitat base is threatened. Habitat destruction in southern Canada and the Dakotas is probably the gravest threat to North American ducks, one that federal and state agencies along with a number of private organizations have taken action to reverse.

Since the first major land acquisition program, Migratory Bird Conservation Act, came into being, over 12 million acres of wetland have come under the protection of the federal government through fee title or easement. These acres provide production, feeding, migration and wintering habitat throughout the four flyways. It is estimated that 1.6 million waterfowl are produced annually on these federally controlled areas, with about 75 percent of this production occurring in the Central Flyway. Another 5 million acres are under state control. In the Canadian provinces, federally owned waterfowl areas total about 48,000 acres. In the NW territories, over 27 million acres have been set aside as migratory bird sanctuaries.

Private organizations such as the Nature Conservancy, the National Audubon Society, and Ducks Unlimited also contribute valuable areas for waterfowl. Since 1938, Ducks Unlimited has spent over 48 million dollars to develop 1,400 waterfowl projects involving some 2.5 million acres of habitat.

Much of Kansas' natural waterfowl habitat is also being threatened by economic pressures. Many of the thousands of ephemeral potholes in western Kansas that have offered excellent hunting in the past are being filled to smooth the way for center-pivot irriga-



Pintail drake

Frank Heidelbauer

tors. A 1960 survey of Kansas water important to ducks and geese listed more than 23,000 acres of stream habitat of major importance and another 2,000 acres that were of some use to waterfowl. These figures are probably far shot of the actual stream acreage used by ducks in Kansas. A U.S.D.A. report estimates the total area between the banks of Kansas streams at 485,000 acres. Nearly all of the Arkansas and Missouri rivers and their major tributaries are of major importance to ducks, especially the wooded watercourses in eastern Kansas which support the majority of the state's wood ducks. Channelization, the demand for more irrigation water, and a dropping water table threaten much of this riparian waterfowl habitat.

There are relatively few marshes in Kansas, but the major original marshes in the state were important waterfowl staging areas. Most of these marshes were sold and drained for agricultural use; only the wetlands at Great Bend, Jamestown, and Quivira were preserved and expanded by construction. Artificial marshes built since 1950 have partially compensated for the loss of these originals; Neosho and Marais des Cygnes Wildlife areas were turned into marshes with strategically placed dikes. There are also managed artificial marshes associated with the reservoirs at Tuttle Creek, Marion, Fall River, John Redmond, and Perry lakes. Others are planned.

For ducks, the construction of artificial lakes is probably the brightest spot in Kansas water management. In March, 1974, there were 23 federal reservoirs either completed or under construction—159,000 acres of water. State watershed districts have used Soil Conservation Service funds to construct 429 smaller dams which hold 14,000 acres of water at sediment pool levels. State and city lakes account for another 9,500 acres of impounded water. Finally, private hunting clubs have maintained or established thousands of acres of waterfowl habitat scattered across the state.

These are particularly evident along the Neosho, Marais des Cygnes, and Kansas rivers. Without the interest and concern of the waterfowl hunter, most of these areas would have long since been drained and converted to farming.

Whether these man-made lakes and marshes are of any use to waterfowl depends to a large degree on the way in which they are managed. Many of the marshes and a few of the state's reservoirs have been put on a water level fluctuation schedule. Water levels are dropped in the spring to encourage the growth of smartweed, barnyard grass, and other weeds that provide food for ducks. Often, the mudflats are seeded with Japanese millet or some other domestic crop to augment the native foods. These flats are flooded just before the beginning of the migration, creating excellent fall duck habitat. Row crops like milo and corn and wheat and clover browse are planted at the upper ends of most reservoirs. The row crops provide high energy food for waterfowl and browse makes good pasture for grazing geese. Some parts of these state-managed areas are closed to hunting to offer a refuge to the birds. These refuge areas often increase duck use and keep hunters from driving waterfowl completely out of the area.

On lakes and ponds that are not intensively managed for ducks, waterfowl use varies markedly depending largely on the age and depth of the impoundment. Generally, the older the body of water, the more beneficial it is to waterfowl until sediment finally fills the basin and the dam is no longer maintained.

One element of waterfowl management that has been neglected is the management of private ponds. Originally, the primary purpose of ponds was to hold water for livestock, but lately more and more are designed for recreation. Unfortunately, the ideal fish pond and the ideal duck pond are not much alike. The wildlife "shallow" pond "or small marsh" differs from the fishing pond in several ways. Mainly it emphasizes shallow water and vegetation is encouraged rather than discouraged.

New areas for waterfowl can be created on grounds of low value and little use by flooding them with a few inches to three feet of water. Borrow pits, lowlands or poorly drained depressions are all potentially useful and productive. Often these areas can be developed with the construction of a short low, terrace-like dike and control structure. An "ideal" structure for impounding water in these areas would be designed so that no more than 25 percent of the area is flooded to a depth greater than two feet. Assistance in the development of Shallow Water Areas for Wildlife is included within the Kansas Agricultural Conservation Program (ACP) and is administered through the ASCS.

The key to marsh or pond management is having the water "off" or "on" at the right time. This is often demonstrated in nature, when shallow water areas dry

up during the summer months, allowing the growth of wild millets, sedges and smartweeds. These areas, when reflooded by autumn rains provide excellent waterfowl feeding areas, and often result in spectacular waterfowl concentrations. Constantly stable water levels, or level changes at the wrong time, reduce the value to waterfowl by encouraging the encroachment of plants ducks don't find palatable.

Basically, most desirable plant foods require a periodic water level drawdown to moist or dry ground for growth. They then must be flooded to be attractive to waterfowl. Lowering water levels also speeds up organic decomposition which releases nutrients bound up in submerged organic materials. And, as reflooded vegetation decays, carbonic acid is created, which may precipitate suspended clay, clearing excessively cloudy water.

In Kansas, a two- or three-foot drawdown in June or early July is recommended. As soon as the water is off, the mudflats may be sown with Japanese millet or smartweed. These plants, once established, will make good growth in moist soil or even in several inches of water, as long as the major portion of the plant is exposed to the air. In late summer or early fall, the water level may be gradually increased to make the seed available to waterfowl over a period of time.

In clear ponds, desirable duck foods such as sago pondweed, or American pondweed may be added in April or May. Remember; pondweeds will make rapid growth in suitable water environments and may interfere with fishing.

A problem with the drawdown technique is that annual drawdowns may encourage undesirable stands of cattails, willows and bullrushes. Because of this, a drawdown every two or three years may be the best practice. If solid stands of emergents such as cattail are present, control measures such as mowing, discing or burning may be undertaken during the drawdown period.

The way the land around the pond is used also influences its use by waterfowl. Overgrazing destroys shoreline vegetation and nesting cover. Bare, muddy shores increases turbidity of the water and lower the amount of aquatic plant and animal foods. On the other hand, completely protected shorelines may grow up to tall emergent plants, such as cattail and bullrush, which also reduces the use by dabbling ducks. In most cases, good range management is also good waterfowl management. Fencing the shallow end of the pond area is desirable when overgrazing is an annual occurrence in order to reduce siltation in the pond.

Excessive shooting prevents utilization of the food supply and will "burn" the ducks from an area. Some arrangements such as alternate day shooting, half day shooting, or if the marsh or pond is large enough, setting aside part of the area as a refuge will assure the presence of ducks on the area.

RESIDENTS

Although Kansas is known primarily as a migration and wintering area, a moderate amount of nesting and production does occur, with potential for considerably more.

Fourteen duck species and one goose species are known to have nested or are nesting in our state. These include blue-winged teal, mallard, pintail, gadwall, redhead, ruddy, shoveler, mottled duck, canvasback, wood duck, green-winged teal, cinnamon teal, American wigeon, black duck and Canada goose. Of these, four are common summer residents.

The wood duck is our most abundant nesting duck. Although population densities are greatest in the eastern two-thirds of the state, woodies nest and produce young wherever adequate mature timber and quiet water occurs. During 1977, there was approximately one wood duck brood averaging 7.3 young for every five miles of river, stream or creek in Kansas.

There are areas, many on private land, that have good potential as wood duck nesting and production habitat. In many cases, providing small marshy areas is all that is needed. Other areas would probably meet a wood duck's approval if a few predator-proof nest boxes were provided. The potential is there. Wood ducks are very tolerant of people. It is not unusual, where adequate habitat is available, to have them nest and produce young in a backyard. Besides expanding wood duck populations these backyard broods allow everyone the enjoyment of observing one of the most

beautiful ducks in the world.

The two other duck species which are common nesters in Kansas are the blue-winged teal and mallard. Blue-wings breed in limited habitat over approximately the northwest two-thirds of the state while nesting mallards may set up housekeeping farther south and east. Both species require quality grassland nesting cover adjacent to water areas. The largest blue-wing breeding population occurs in central Kansas at the Cheyenne Bottoms Wildlife Area. As many as 10,000 young have been produced there in one year.

The Canada goose is the fourth species which commonly nests in Kansas. Although production is limited, techniques for the establishment and management of resident free flying flocks of giant Canada geese are well known. In the past, two areas in Kansas, Kirwin National Wildlife Refuge and Cheyenne Bottoms Wildlife Area, have provided more than 200 goslings each for several years.

The big problem here is providing adequate protection from hunter harvest. Locally produced geese are very susceptible to gunning on their production areas. This leaves us with a choice: close large areas to goose hunting to protect our geese or allow hunting and sacrifice the local production. In Kansas, where waterfowl hunting areas are scarce, we felt the price for a nesting population was too high, and goose production in all likelihood, will remain limited.

Pair of blue-winged teal



Frank Heidelbauer

WHAT MAKES A WATERFOWLER

Rising shovelers

Ken Stiebben



Waterfowlers have often been called a “crazy breed” dedicated beyond reason to their sport. This opinion may be reinforced by watching a duck hunter get ready for a hunt. Waders, gun, call, camouflage, boat, four dozen decoys, a wild retriever, a wake-up call in the middle of the night—the hassle and cost of a duck hunt all support the idea that these hunters are insane, obsessed, or a little of both.

A recent study of waterfowl hunters conducted by the U.S. Fish and Wildlife Service might shed some light on the duck hunter. Some of the results are interesting. The waterfowler’s average age is 35. Seventy percent had hunted waterfowl before their eighteenth birthday, with about half of these initiated into the sport by a father or an older friend or relative.

They value their time on the marsh for different reasons. Obtaining food was an obvious but not primary value. Hunters interviewed described waterfowl as wary and intelligent with extremely acute vision. They considered the duck or goose as a worthy adversary that required great skill to “defeat”. A very high value was placed on the actual contest. For instance, 76 percent of the hunters preferred to work all day for a limit rather than obtain it quickly. Although their greatest enjoyment came from the contest itself, occasionally bagging a duck was necessary to maintain enthusiasm. Over 60 percent stated that they would pay \$10 for a duck stamp, indicating a strong commitment to waterfowl hunting.

When presented a situation where a more liberal harvest was possible, 72 percent favored longer hunting seasons, while 29 percent preferred larger bag limits. Asked their opinion about opening and closing dates, 39 percent were satisfied with current seasons, 12 percent preferred earlier opening and closing dates, while 49 percent wanted seasons that opened and closed later. Those that preferred a later season viewed harsh weather as a very desirable component of the hunting experience.

It was also found that hunters considered certain violations of hunting etiquette to be more serious than violations of some hunting laws. Not retrieving a duck that fell in a place difficult to reach or shooting over another hunter’s decoys were considered serious breeches of etiquette and ranked above hunting without a license, or hunting at the wrong time of day as improper behavior.

The overall picture was one of commitment. The duck hunter invests time, money, and discomfort in his sport; there aren’t many fainthearted shirkers to be found in the marsh. At his best, the waterfowler embodies the skill, patience, and endurance that has always characterized the true hunter.

THE FUTURE



Canvasback drake

Human population growth dwarfs in importance any other issue likely to influence the future of waterfowl management. More people, bigger cities, a shift from a rural to an urban society, and the associated demands for lands just to meet man's basic needs may cause shifts in basic values that will eliminate anything man regards as unessential to survival. Current trends can only increase the competition for habitat that waterfowl need. A reduction in habitat will reduce waterfowl numbers. Also, a reduction of places to hunt will limit hunter numbers.

Because natural beauty and diversity of outdoor experiences are part of a healthy environment, the preservation of waterfowl as a resource to be studied and admired will receive strong public support. But preservation for these limited purposes does not require maintaining wildlife in huntable numbers.

Because natural beauty and diversity of outdoor experiences are part of a healthy environment, the

preservation of waterfowl as a resource to be studied and admired will receive strong public support. But preservation for these limited purposes does not require maintaining wildlife in huntable numbers.

As the pressure on our waterfowling areas increase, the quality decreases. The decline in quality may be a greater threat than we envision. In the past, managers have backed away from the quality problem. The statement, "quality, like beauty, is in the eye of the beholder" has been made. This may be true, but an increasing number of hunters mention "unsportsman-like acts" when discussing the problems of waterfowling. No social benefit can be derived from a recreation that destroys peace of mind or which encourages lawless behavior. Frustrations, illegal hunting, and failure to support waterfowl programs will threaten our waterfowl hunting tradition the same as loss of habitat.

The mussel occupies a precarious position in the world.

Basically, his problem is he's about as vulnerable as he is helpless. That vulnerability is demonstrated early in life, when the mussel enters the glochidial stage of development. The new-born mussel, or glochidium, is expelled from the gills of the female mussel and latches on to the first fish which passes his way. If no fish appears during that critical period, the glochidium will die within a short time. If the glochidium lands on a species of fish other than the species he requires during that stage, he will drop to the bottom of the pond and die within a few days unless a suitable fish host happens along.

After finding a suitable host, the microscopic glochidium "hitchhikes" on the fins or gills of the fish for two to six months, depending on the species of mussel, while he is developing adult organs. When the metamorphosis is complete, the juvenile mussel is shucked from the fish to the bottom of the pond or stream it inhabits. Unless the young mussel is immediately eaten by a fish or is deposited into silt deep enough to suffocate him, it is there the mussel will live out his entire life.

It's not that the mussel can't move. It's just that travel is not his basic purpose in life. So he's been given a single foot which, expanding and contracting, slings him along at a rate of two or three feet an hour.



Bob Mathews

Bob Mathews

More often, though, the foot is simply an anchor to the substrate of the stream or pond the mussel inhabits. Using the foot as an anchor, and a balancing mechanism similar in principle to what we have in our inner ear, the mussel pumps water through his system, extracting life and sustenance from the suspended plankton and particulate organic matter.

About the only moving he does during his life is to deeper or shallower water, where the temperature and available food are best suited to his needs.

In fast-flowing streams, some mussels are found at

depths of fifteen feet or more. In Kansas, mussels are frequently found in two to four feet of water during summer and early fall, but as the water cools in late fall, there is a general movement to deeper pools.

The mussels's foot takes care of these basic locomotive needs admirably, but if his environment is invaded by pesticides, silt, or industrial pollution he is ill-equipped to race away from trouble. Another obvious hazard is drought.

Still another potential hazard, which is not likely to occur, is a reversion in practice by clothing manufac-

turers, who used buttons made from the pearly nacre derived from fresh-water clams until about 1912, when plastic buttons were introduced. The year before the bottom fell out of the pearl button market, more than 17,000 tons of shells, almost one-fifth of all pearly products taken in the U.S. that year, were removed from the Neosho River in Kansas. Although Kansas mussels still are used as components in the cultured pearl industry, the demand for those shells fluctuates widely from year to year.

Most Kansas residents have stumbled across crumbling, sun-bleached clam shells along the banks of streams or ponds, but it is probably safe to presume that the average person knows little about how mussels live. That's understandable. Few creatures command less attention. To say that a mussel is unobtrusive is gross understatement.

There have been some major exceptions to a general indifference toward this underwater invertebrate, however. In 1962, two University of Kansas professors authored the first comprehensive guide to mussels in Kansas. The "Handbook of Unionid Mussels of Kansas," by Harold D. Murray and A. Byron Leonard combined mussel studies in the state into a guide to the 41 species of freshwater clams inhabiting our waters. Supplementing their own investigations with observations by earlier biologists, Murray and Leonard provided an important data base for modern mussel investigation efforts. Biologists can tell much about condition of our lakes and streams by comparing current mussel distribution and numbers with the information reported by Murray and Leonard.

"The absence of mussels . . . is of value as an indication of environmental stress only when their former presence can be demonstrated," reads a report published in 1977 by Kansas Biological Survey aquatic biologists Donald Huggins and Paul Liechti. "Mussels are valuable in bioassay and biomonitoring studies," the report continues.

In the eastern U.S., there has been and continues to be much more study of mussels, for a couple of reasons. That portion of the country has gone through more drastic aquatic and environmental changes than the Midwest. Historic information on mussels east of the Mississippi River suggest that many have disappeared and many more are following. Also, the eastern regions of the country hold the greatest diversity of mussel species in the world, an indication that fresh water clam life first developed in the Mississippi Valley. Kansas is located at the periphery of the western range of the Mississippi Valley assemblage of mussels.

Murray and Leonard warned of the necessity for immediate controls on industrial pollution and increasing siltation of Kansas streams, because of the decrease in abundance of several species.

"Generally, there is a decline in the numbers and kinds of species in some of our streams; not all of them," said Huggins, reiterating the concerns voiced



The warty-backed mussel, one of two endangered mussel species in Kansas.

by Murray and Leonard. "It's not a totally bleak picture. But man-induced stresses have been unkind to the mussel," Huggins added.

Mussels are filter feeders. Because of that, Huggins said, they are low on the food chain and among the first affected when the stream or lake ecosystem takes a turn for the worse.

"They can give you a pretty good picture of what's happened to our streams," Huggins said. "Right now, we couldn't tell you what parameters of change or stress have the most extensive effect. We don't know if it's increased siltation from farm lands, effluents from sewage plants, changes in fish populations, or what is most responsible for changes in mussel populations. We don't know exactly to what extent dams have an effect. How important each of these factors is we have no idea. We just know from comparing history that there has been a general decrease."

Although mussels in Kansas have a high tolerance to siltation, they are not tolerant to industrial pollution, Leonard and Murray reported. Pre-settlement Kansas streams were relatively clear. But the advent of agriculture and industry resulted in increased turbidity and industrial pollution. The two researchers noticed the difference in what they saw and what a researcher named Scammon reported in 1906 concerning abundance of the creatures. In some areas where Scammon reported species as common, they now are rare.

Dr. Don Distler, associate professor of biology at Wichita State University, first became interested in the study of mussels because they were disappearing from some of the streams and ponds in which he had found them in abundance several years earlier.

"I work with fishes mainly but I saw mussel habitats disappearing at a rapid rate," he said. "And mussels

can't just leave when their habitat turns bad." When Charles Cope, a graduate student in biology who works with Dr. Distler, decided to study mussels as part of his master's degree requirements, he was encouraged by the professor to concentrate his effort on a survey of the distribution of fresh-water clams in the Little Arkansas River basin.

"That area has gone through an extreme amount of change in the past fifty years," Dr. Distler said. "And what's planned for the future is unbelievable, with channel modification, dredging, taking more water out, putting more sewage in. With those possibilities, I can see the rapid extirpation of fresh-water invertebrates as well as fishes."

Mussels are effective pollution detectors because they are filter feeders and are affected by anything in the water, Cope said. As a result, he said, their condition reflects the presence of pollutants before they become concentrated enough to kill fish. In addition to pollution, mussels are susceptible to temperature changes, Cope noted. For example, if shade trees are removed from the edge of a stream, the resultant rise in water temperature may cause a decrease in mussel populations, since gravid females are especially vulnerable to temperature changes.

Filter feeders in general all serve by recycling the nutrients in the water they inhabit, Cope said. In ponds, they are continuously recycling nutrients. They increase the continuity and stability of a stream by taking in the suspended food and storing it, thereby slowing the removal of the biotic energy through the stream.

Mussels feed by sucking in water and food with cilia on the inner surface of the mantle, on the gills, and in the viscera. The hairlike cilia beat together in a coordinated pattern to draw in a stream of water. Inedible material is separated soon after it is sucked in and expelled before it passes through the digestive system. One early researcher estimated the siphoning rate of the fat mucket mussel at 8.8 gallons per day.

Mussels can feed continuously, since the two valves of the shell normally gape slightly to permit the foot to protrude and the siphoning system to do its work.

Mussels take nutrients from the water and increase the size of their shells by secreting a calcium substance at the margins of each valve or shell half. Typically, the periostracum or outer layer of the mussel shell shows dark, thin lines alternating with light, broader areas on the shell. The thick, dark lines are formed during "rest periods" during which growth is arrested. Although the lines can be used to estimate the age of some species, that practice is not always reliable. Fluctuations in water level, pollution of water at various intervals, scarcity of food, and other adverse conditions may also bring about a period of arrested growth.

The average life span of most species of mussels found in Kansas is eight to fifteen years. The floater mussel, the most common and widespread of Kansas

clams, has a life span of twelve to fifteen years. One species of fresh-water clam which doesn't occur in Kansas lives to 100 years of age.

Normally, as stated before, the mussel distribution depends on the fish mussel larvae ride with. Reproduction begins when the sperm of the male clam passes to the outside of its shell and is drawn into the feeding current of the female. The sperm is carried to the water tubes of the gills of the female where the eggs are fertilized and development begins. The embryos develop into small larvae called glochidia, which range from one-eighth to two-thirds of a millimeter in length. The general form and outline of the glochidia resemble adult mussels but further development depends on a suitable fish host. Most mussels are species specific; they depend on a particular type of fish to serve as the host. Salamanders and frogs, to a lesser degree, also serve as hosts.

When the glochidial stage begins, the glochidia are discharged from the parent and imbed in the tissues of the fish host. The glochidium does not harm the fish nor nurture itself on the fish's tissue. Most species remain imbedded in the fish for a period of 70 to 90 days, but some remain for up to 180 days. During this stage of development, the glochidial structures change markedly, but the size of the glochidium remains about the same.

Some mussels are highly specialized at the task of finding a fish host, according to Dr. Distler. In one species, the female mussel dangles part of her mantle (a lobe of tissue on the inner surface of the shell) outside her shell. The exposed mantle resembles a type of forage fish which attracts the bigger host fish. When the fish moves closer to investigate, the clam senses it and shoots a cloud of glochidia at the fish. Another species excretes a mucous substance which remains suspended in the water and allows glochidia attached to the substance to latch onto a fish as it swims past.

After completing the glochidial stage, mussels spend the rest of their lives partially or wholly buried in mud, sandy mud, or mud and rock bottoms of streams, ponds, lakes, canals, and swamps—any permanent body of water. The mussel generally situates himself so that the posterior portion of the shell protrudes from the substrate and is directed upstream. In that way, food materials are in part forced into the mantle cavity by the force of the water current, and excreted waste products are quickly swept away.

Although certain Indian tribes included fresh-water clams as part of their diet, the value of Kansas mussels as human food since the late 1800's has been negligible. Of course, that is not to say mussels are inedible. Dr. Distler says the principal ingredient in some of the best clam chowder he ever tasted was the diced and pressure-cooked flesh of mussels taken from a Cowley County pond a few years ago.

"The pond they were taken out of was crystal clear because the clams were filtering every bit of the phy-

toplankton in it," he said. Unless he could find a pond or stream that he knows is unusually clear of impurities, however, Distler says he probably wouldn't eat any now. The growing incidence of polluted waters, along with the mussel's tendency to catch and "biologically magnify" those impurities, must be considered before planning a Kansas clam bake.

As a natural resource, Kansas mussels are most valued for the price they bring from shell buyers for the cultured pearl industry in Japan. Certain species, like the giant washboard or the three-ridge, build thick shells that are used in the cultured pearl process. The thickest parts of the shell are sliced and then cut into cubes. The cubes are ground and polished into perfectly round pellets and are placed in three-year-old oysters. For the following three or four years, the oyster coats the implant with mother of pearl. The pearl is then harvested.

Virtually all of the 32 Kansans who this year purchased mussel fishing licenses do their musseling by hand, sometimes with a small boat in tow as they wade streams. As they feel along the substrate, they can easily locate mussel beds with their feet, then begin loading the boat or sack. Licenses are required for any persons who plan to sell the shells. There is no quantity limit currently in effect but Kansas law prohibits taking mussels less than one and three-fourths inches long.

Loren Collins, a Neodesha resident, estimates that he and a partner probably took forty to fifty tons of mussels from the Verdigris and Fall Rivers in one recent year. He says it's not unusual for him and his partner to pick up a ton of shells apiece in one night of working late. The mussels are always there, Collins said, but the best time of year to collect them ". . . is as soon as the water is warm enough to wade." And the lower the water the easier the pickings, he added. "It really helps if you've got two guys working because it's a lot of work getting that many shells up the bank and into the truck. It's work but I'm a river rat anyway so I enjoy it," Collins said.

The Verdigris River is one of the richest mussel-producing areas of the state but the Neosho River is *the* richest, according to Murray and Leonard. Almost every one of the 41 species of mussels found in the entire state are present in the Neosho, which is one of seven rivers or portions of rivers open to musseling. Mussel fishing areas, as designated by the Fish and Game Commission, include the Neosho River from John Redmond Reservoir to the Oklahoma line; Verdigris River from Toronto Reservoir to the Oklahoma line; Fall River from its junction with the Verdigris to Fall River Reservoir; Walnut River from El Dorado to the Oklahoma boundary; Spring River; Elk River; and the Little Walnut River.

Mussel fishing licenses currently are sold for \$5 to residents and \$25 to non-residents. However, a bill

recently approved by the Legislature restricts sale of mussel licenses to residents only for \$25. The new fee is effective for licenses purchased after Jan. 1, 1979.

The densest populations, obviously, are in the south-central and southeastern regions of the state. All of the species occurring in the state are found there but no more than eight species occur west of the division between the Central Lowlands and Great Plains (geological entities separated by a north-south line separating roughly the eastern one-fourth of the state from the western three-fourths). Murray and Leonard concluded that the kinds and numbers of mussels decrease from the southeastern to the northwestern and southwestern parts of the state, and few or no mussels occur in the extreme western corners.

In their 1962 publication, Murray and Leonard stated that three species previously reported in Kansas were probably extirpated. However, the State Biological Survey staff in their most recent surveys found two of the three thought absent. So far, 34 of the 41 species documented by Murray and Leonard have been collected in the most recent survey. The fact that all 41 species have not been accounted for doesn't necessarily mean those species are no longer present in Kansas, Huggins emphasized, since the survey is still underway. But that is a possibility that must be considered until all of the 41 species are accounted for.

Meanwhile, three species are listed as endangered in Kansas. Staff members of the State Biological Survey, however, believe that one of the three—the fat pocketbook pearly mussel—does not now occur in Kansas and probably never did. Earlier Kansas researchers may have misidentified abnormal specimens of another similar species as the fat pocketbook to ". . . perpetuate a long-standing taxonomic error," Huggins noted.

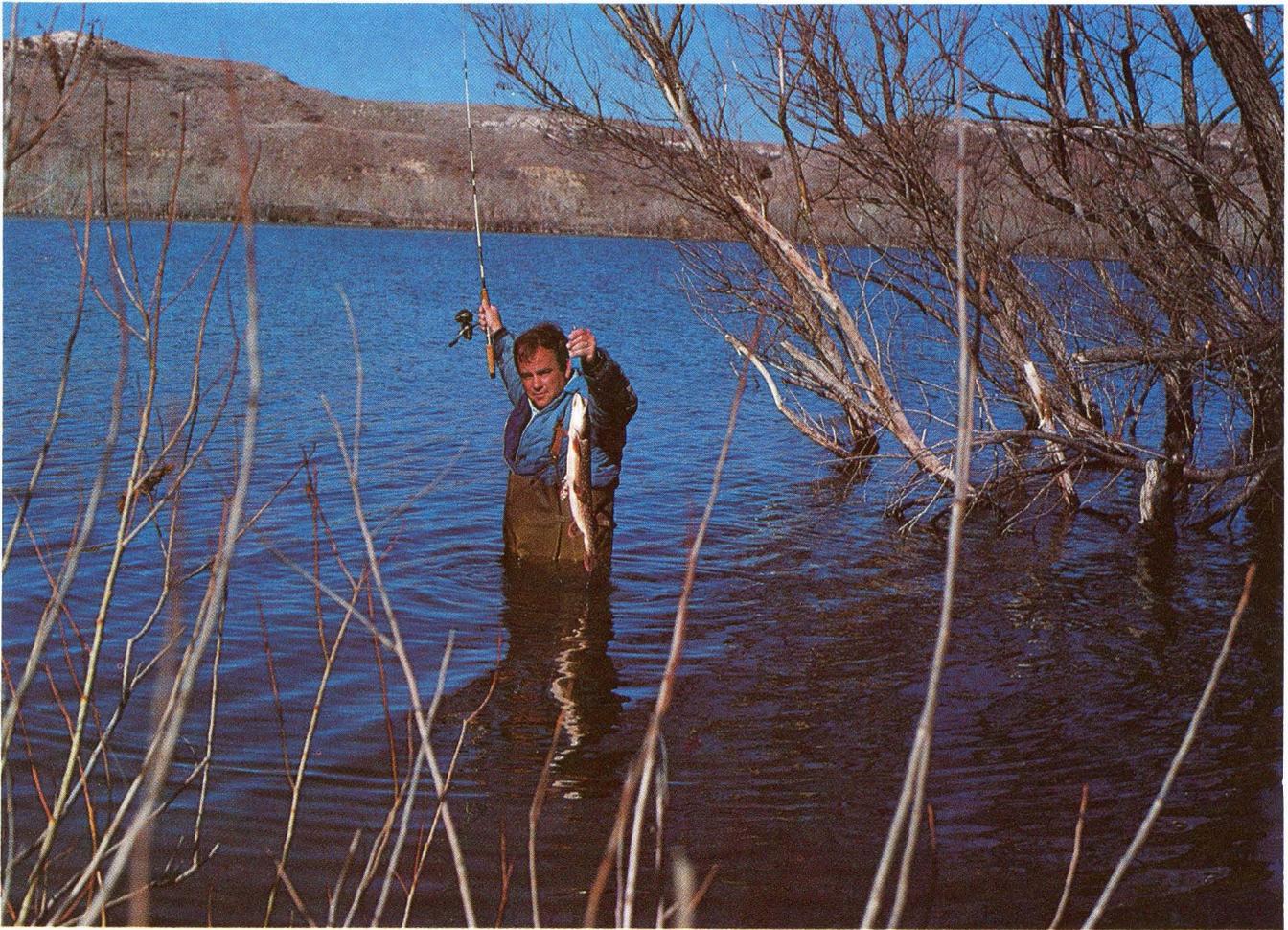
However, two other species—the warty-backed and heel-splitter mussels—are rightly listed as endangered in Kansas, and occur only in rare, isolated aquatic environments.

"Almost anything you do to a stream affects organisms in it," Dr. Distler said. "Intermittent flow hurts them. Siltation buries them. And there are a lot of other potential dangers. The mussel is basically imprisoned."

But if the existence of these undercreatures is in jeopardy it can only mean there is trouble headed our way. In the same manner in which the peregrine falcon's decline a few years ago alerted us to the hazards of DDT, the mussel's struggle for survival is a reminder that it's up to us to preserve our natural environment, for our own good.

Huggins sums up his concern for the mussel this way:

"Mussels are under quite a bit of environmental strain and we owe it to ourselves to find out more about them."



Ken Stiebbert

New Life for Reservoirs

Troy Schroeder

Why isn't fishing in this reservoir as good as it was a few years ago? Kansas Fish and Game Commission biologists often hear this question. The answer is complicated, but it is generally true that the best fishing in reservoirs occurs within the first few years after initial filling. This fishing boom is usually followed by a period of poor fishing.

Recently flooded vegetation, high water fertility, and an abundant food supply in new reservoirs are excellent fish habitat. The fish population rapidly expands to fill the available habitat. The vigorous, fast growing fish are often very susceptible to angling.



Cal Groen

Hand seeding of millet on exposed mudflats is giving way to aerial planting. Pioneering weeds and millet take over fast, greening up the edges of the reservoir by late summer, as at right.



Unfortunately, these new reservoir conditions are short-lived and can only be exactly duplicated by completely draining a lake, allowing vegetation to grow on the exposed lake bottom for one or more years, then refilling the lake. Of course this is not practical on most multipurpose reservoirs because of other water needs such as city, industrial or agricultural water supplies, recreation, etc.

These new reservoir conditions may, however, be prolonged by filling the lake slowly over a period of years. The area of the reservoir expands each year with new habitat becoming available with each water level rise. This technique was successfully used at Melvern Reservoir and will likely be used at other new reservoirs. Melvern was filled over a three-year period, 1973-1975, and is still producing good fishing five years after the first water was impounded.

Fishery biologists are attempting to improve the fishing at many older Kansas reservoirs by recreating these new reservoir conditions on a small scale. Water levels at many Kansas reservoirs can be manipulated a foot or two above or below the normal conservation pool level without interfering with any intended reservoir purpose.

Although all Kansas reservoirs are unique and most water level plans are designed for a specific purpose at a specific reservoir, here is a typical water level management plan.

The water level is gradually raised between March 1 and May 15 to flood terrestrial vegetation and clean rocky shoreline. This provides valuable spawning and nursery habitat for sport fish such as walleye, white bass and largemouth bass. The increased lake volume also encourages abundant production of forage fishes such as gizzard shad. This abundant food supply is

necessary to insure good growth rates of sport fish.

The water level is held stable at the maximum level through early summer. This allows the young sport fish time to grow to survival size in the protection of the flooded vegetation. Flooded vegetation adds nutrients to the lake and is partly responsible for the supply of invertebrate foods necessary for the rapid growth of young fish. Rooted vegetation helps tie down the shoreline and limits wave erosion. And, decomposing vegetation also helps remove suspended clay particles from the water.

During the first part of July, the lake is drawn down to a minimum level. This allows the exposed shoreline to be revegetated. It also concentrates forage fish, forcing them out of protective cover so that they are more available to predatory sport fish.

Much of the success of the water level plan depends upon the type and amount of vegetation that can be grown in the drawdown zone. The shoreline is barren and somewhat unsightly for about two weeks until the vegetation becomes established. This, however, is a small price to pay for the many benefits gained by the drawdown.

When reservoirs are drawn down in mid-summer, a large portion of the exposed shoreline is seeded to Japanese millet or hybrid sudan-sorghum by Fish and Game employees. Seeds are scattered over the soft mud either by aircraft or by hand. Millet grows fast and is normally three to five feet tall and mature within sixty days. About 4000 acres of millet were planted at Kansas reservoirs in association with water level management plans in 1977. Parts of the exposed shoreline are allowed to revegetate naturally and usually support smartweeds, nutsedges and a variety of other invaders.

When it is not possible to lower lake levels in mid-

summer or when natural drawdowns occur late in the year, it is possible to achieve some benefits by planting cool season grasses such as wheat, rye or ryegrass.

If waterfowl management is a part of the overall reservoir plan, a small rise is scheduled in the fall. Flooding such choice waterfowl food such as millet, smartweed or nutsedge attracts and holds birds on an area and produces excellent hunting.

In early December near the end of the waterfowl season, the water level is brought down to its annual low. This winter drawdown sets the stage for favorable fish spawning conditions the following spring. The lowered water level reduces ice and wave damage to the existing shoreline vegetation and provides additional storage capacity for spring runoff. This storage capacity is important in order to avoid drawdowns during the spawning season. Spring drawdowns strand eggs and small fish on the shoreline and may wipe out an entire year's production of certain species such as walleye.

This type of water level management is not possible on every reservoir. Western reservoirs like Norton, Webster, Kirwin, and Cedar Bluff may not get enough runoff to refill and are below normal much of the time. However, when these lakes refill after having been low for one or more years, a fishing boom similar to that found in new reservoirs occurs.

On the other hand, some southeastern reservoirs such as Fall River, Toronto, and Elk City have too much runoff and are operated strictly for flood control much of the time. The only fisheries management plan followed is a reduced release rate for the lower portion of the flood pool. When a flood occurs and water levels are high, water is released at a normal rate until a certain part of the flood pool has been evacuated, then release rates are reduced for the lower portion of the flood pool. High discharge rates may be especially harmful to walleye populations as walleye are often easily flushed out of a reservoir. Although some of these walleye are caught in the tailwaters, many small walleye are lost and the lake may suffer a walleye shortage in future years.

Council Grove was the first reservoir to undergo water level fluctuation for fisheries management in 1970; Milford followed in 1972. The first Council Grove plan used a September drawdown and had limited success because very little vegetation could be grown on the exposed shoreline in such a short growing season. The plan was improved to include a July drawdown in 1974. Encouraged by the success at Council Grove and Milford reservoirs, biologists negotiated water level management plans for other Kansas reservoirs. In 1977, a total of thirteen reservoirs were involved in a water level management program. Most of the plans had drawdowns involving less than twenty percent of the total water area. Most of this affected area was in the upper shallow portion of the reservoirs.

One obvious result of water level management has been an increase in water clarity. John Redmond, Kanopolis and Council Grove, all characteristically turbid, responded by a marked increase in clarity. In John Redmond, for instance, it has been difficult to see your hand six inches below the surface in most years. In 1977, however, after the vegetation grown during a drawdown the previous year was flooded, it was possible to see your hand nearly two feet below the surface. Clearer water not only makes the lake more pleasant to look at, but makes it easier for sight-feeding game fish to find food (and lures), boosting their growth rate and providing better fishing.

According to test-netting results at Council Grove and Milford reservoirs, populations of catchable-size sport fish greatly increased as a result of water manipulation plans. Catchable-size sport fish, caught in standard test-nettings, increased about five times from 1974 to 1976 at Council Grove Reservoir. A similar increase was noted at Milford.

Walleye populations in both Milford and Council Grove reservoirs have notably grown with fluctuating water levels, mostly because of the excellent spawning and nursery conditions created by a spring rise in water level. According to a creel survey at Milford Reservoir, the average annual walleye catch jumped from 1200 in 1974 to more than 17,000 in 1976. The average number of walleye caught per fisherman nearly doubled during this time.

Although little natural northern pike reproduction has occurred at Council Grove since the water level management plan was implemented, the plan has been responsible for increased survival of stocked fish. Again, flooded vegetation is the key, providing food and cover for the young pike. As a result of these successful stockings, it is now possible to fish specifically for pike at Council Grove and expect to catch them.

Water level plans seem to be detrimental to carp, buffalo, and carpsuckers. In most cases, the increase in sport fish populations is paralleled by a decrease in rough fish numbers. The summer drawdown probably interrupts spawning, forces young fish out of protective cover, and limits their food supply.

In order to insure that a water level plan is best for all interests, each plan proposed by the Fish and Game Commission is reviewed by the Kansas Water Resources Board and coordinated with the State Park and Resources Authority and with the U.S. Army Corps of Engineers.

The next time you observe your favorite reservoir being drawn down in mid-summer, it should not be cause for alarm, as this is an important part of a management plan to insure better future fishing and hunting. Water level management may very well be the best single tool available for improving fishing in Kansas waters.

