A photograph of three ducks in flight against a clear blue sky. One duck is in the foreground, flying over a field of tall, dry grasses. Two other ducks are flying higher in the sky. 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.

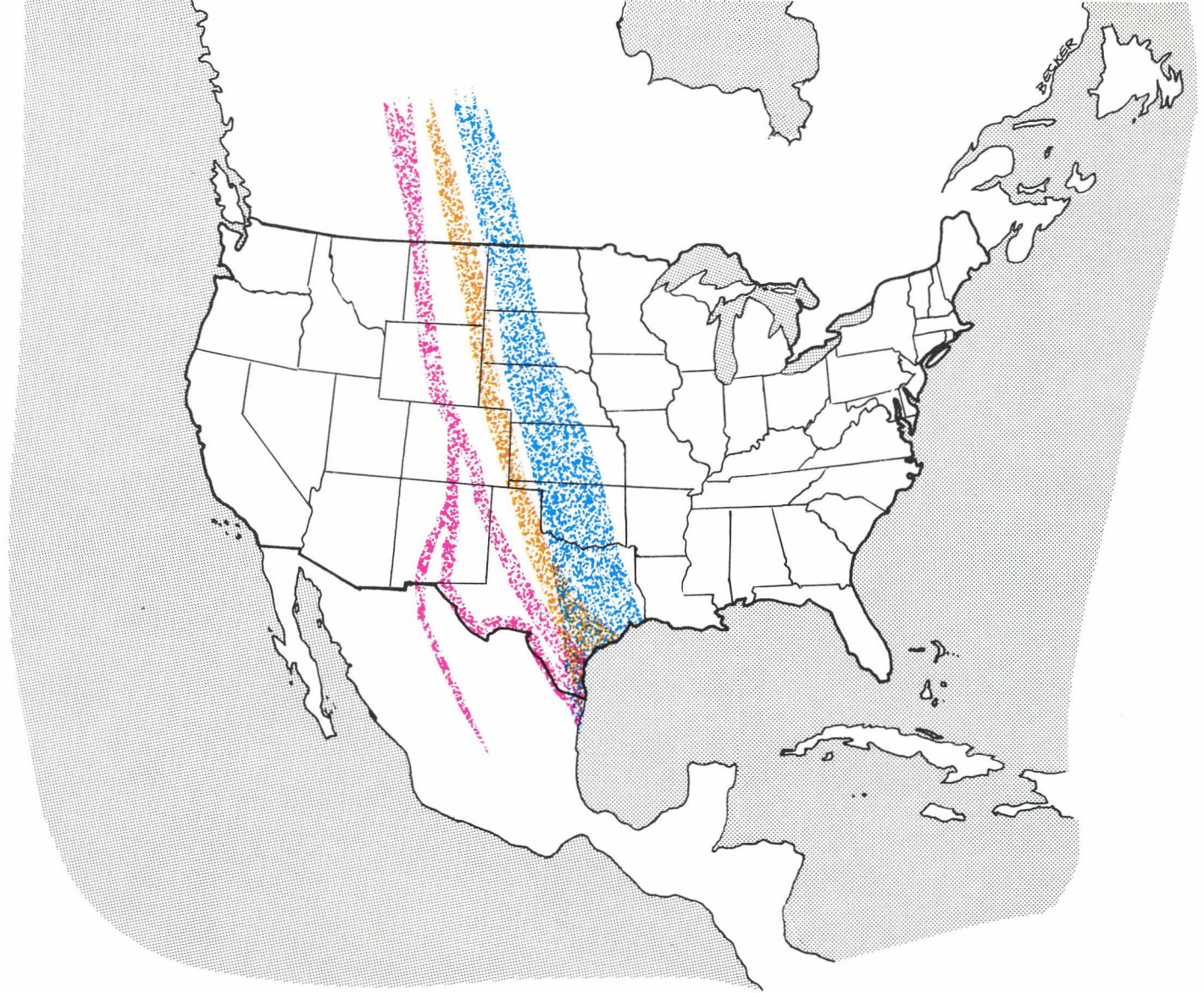
The major wintering areas of the Central Flyway are scattered from Kansas to northern South America. Some of the most important winter marshes are on the Gulf coast from western Louisiana south to the Yucatan peninsula. Some of the flyway's blue-winged teal wander even farther south into Central America, 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

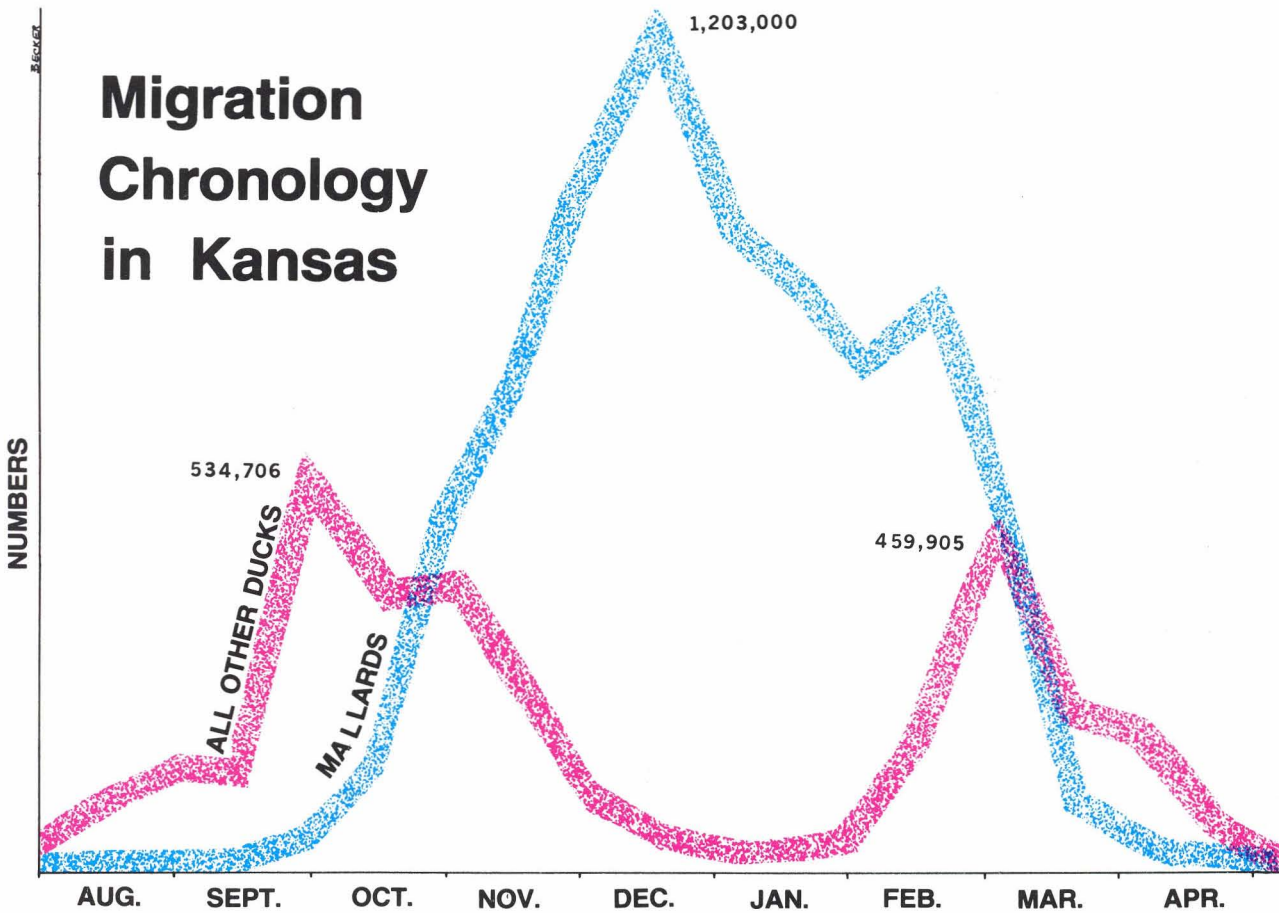
programmed into the endocrine system, having developed eons ago when food shortages necessitated migration. The length of night in comparison to day length (photoperiod) triggers physiological changes such as deposition of fat. Fat is important because of its high energy content, which is needed for 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-

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-

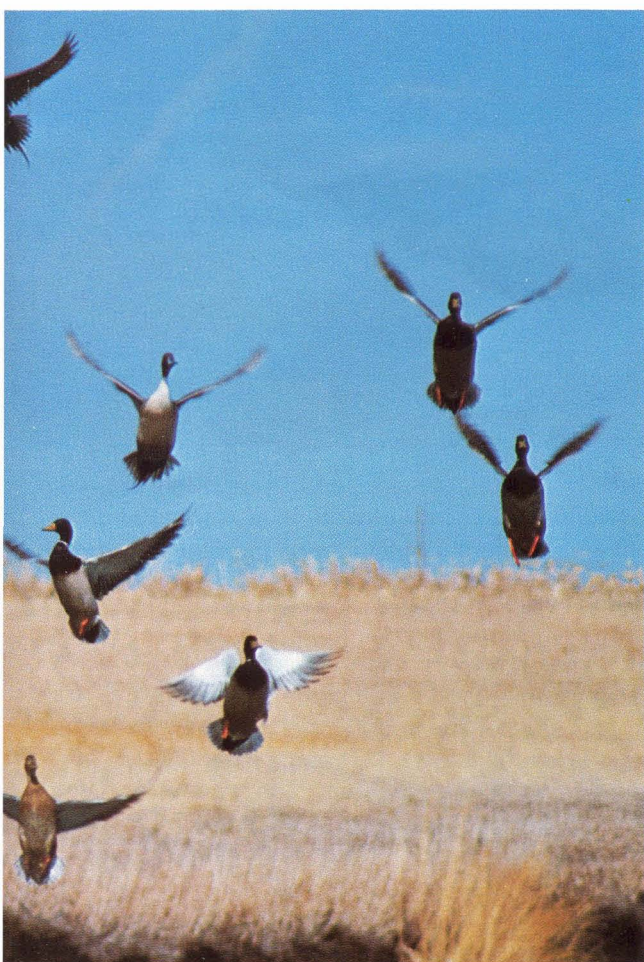
Mallards and pintails



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 breaches 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.

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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.