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## The Ring-necked Pheasant in Nebraska


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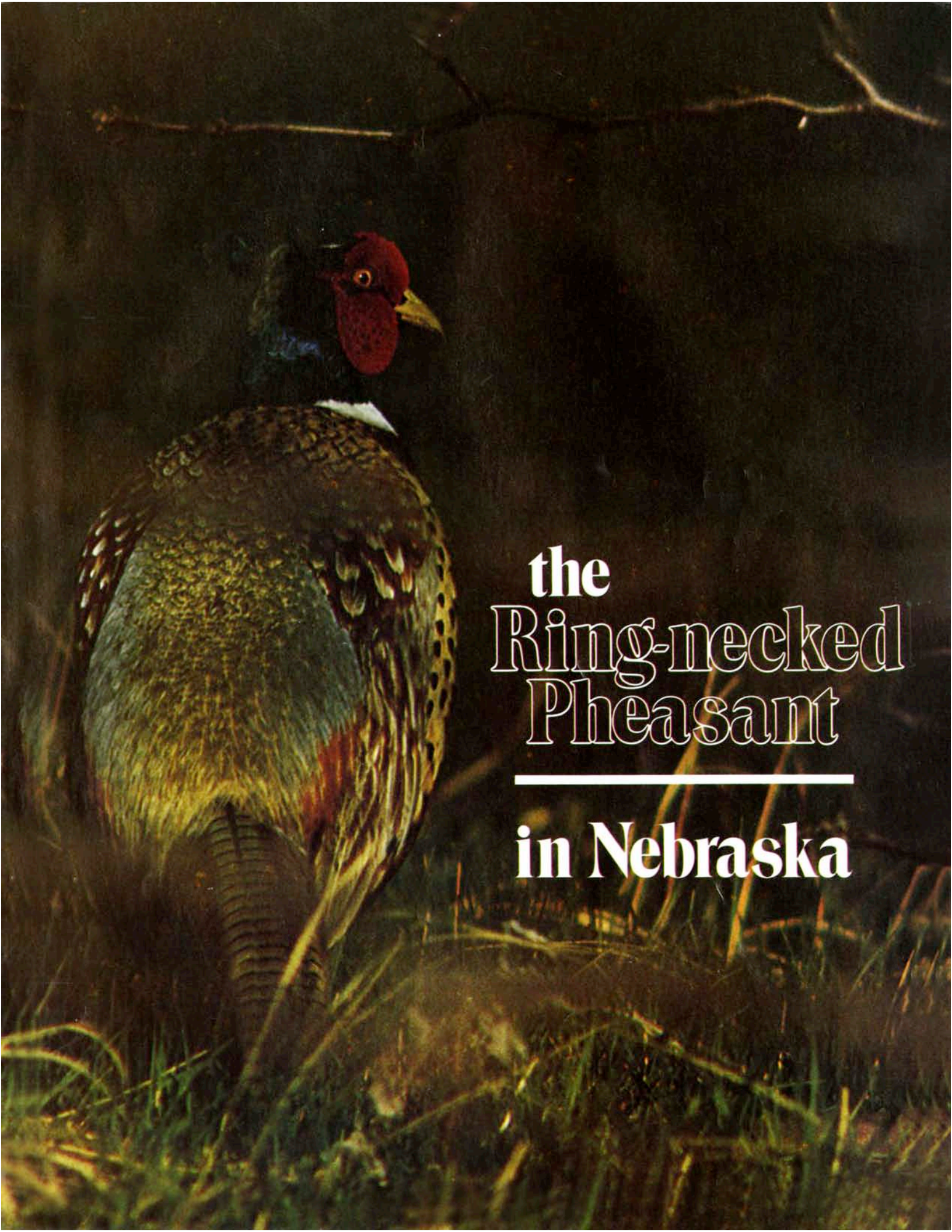
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**the**  
**Ring-necked**  
**Pheasant**

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**in Nebraska**





# Ringneck— Its Past and Prospects

*A most successful exotic,  
pheasant numbers are declining*

**N**O EXOTIC game species can lay claim to being as successful an introduction as the ring-necked pheasant. In his homeland of Asia and Asia minor, however, the ring-necked pheasant that we regard as a superb game bird, is only one of over 40 species that exist from the southern foothills of the Caucasus along the Black Sea to as far east as Japan. The birds of the genus *Phasianus* are perhaps better known than any of the other 15 groups of pheasants in the world. All are related to the partridges, quails, grouse and guinea-

fowls which make up the order *Galiformes* or chicken-like birds.

Modern man is not unique in finding the pheasant of high palatability. Primitive man also found the pheasant a very worthwhile food, according to remains found in ancient kitchen middens. Large pheasants apparently lived in southern France in Miocene days. The Greeks obviously knew the bird in the 10th Century B.C. since their name for the species *Phasianus ornis* (phasian bird) was derived from the birds' abundance along the Phasis River (now Rion) near the Caucasus Mountains. The Chinese knew the pheasant some 3,000 years ago as indicated by ancient paintings and embroideries. The Romans are considered responsible for the spread of pheasants in western Europe. When Julius Caesar invaded England about the middle of the First Century B.C., the pheasant followed close behind. Apparently the pheasant found the English countryside to its liking, for when Chancellor Neville became Archbishop of York in 1465, 200 "fessautes" were among the game served at the banquet. It wasn't until almost 300 years later that the pheasant made his appearance in the New World. Some dozen pairs of the black-necked strain were introduced on what is now Governor's Island, New York. Other varieties of pheasants were also released in the 1700s in New Hampshire and New Jersey. None of these releases were particularly successful.

Not until 1881 when Judge O. N. Denny of Oregon finally succeeded in releasing some 100 pairs of Chinese ringnecks in the Willamette Valley did the pheasant really gain a foothold in the United States. Some 11 years after that, the ringneck had multiplied to such numbers in this highly suitable habitat that the first hunting season saw some 50,000 harvested on the opening day. From that time on, pheasants were propagated and released by individuals, state agencies and clubs. For all practical purposes, pheasants have

been established everywhere in the continent where suitable habitat exists.

The first occurrences of pheasants in Nebraska were in 1900 to 1904, when individual birds were reported to have been shot at various points along the Kansas line in southeastern Nebraska (Table Rock, Pawnee, Barneston, etc.), these probably having been northward stragglers from some of the early private Kansas importations. The earliest stocking attempts by the state were made around 1915 with several dozen birds. During the next 10 years, small shipments were released by the game agency each fall. State releases were supplemented by private individuals to some extent, particularly in the central portion of the state. Today's pheasant numbers, estimated at approximately 3½ million birds, were thus derived from what was probably fewer than 500 pairs.

The increase of what was primarily a mixture of Chinese, Mongolian and blackneck strains of the ring-necked pheasant demonstrated the tremendous biotic potential of this bird. Adaptation to the changeable climate of Nebraska, and to the habitat associated with grain culture of the plains was nearly perfect—almost too perfect, in fact. By the early 1920s, corn damage from pheasants was being reported in central Nebraska. Looking back, it's found also that material was prepared for the farmer in 1945 giving directions for preventing damage to corn. Even spring shooting was tried until it was concluded that this type of random shooting did not stop any important number of the birds which had acquired the corn-digging habit. The corn-digging habit apparently resulted as birds worked around the base of corn plants in search of cutworms.

By 1926, pheasants were so plentiful in Howard County that some 15,000 were winter-trapped and distributed in 49 other counties of the state. A year later, about 30,000 birds were trapped in Howard, Sherman and Valley counties for distribution in 76 counties. That pheasants were abundant in this area is borne out by the fact that the 1926 trapping effort

removed an average of 27 birds per section in Howard County.

Stocking was continued throughout most of the state during those early days of the pheasant in Nebraska. The State Game Farm, established south of Norfolk, began operation in 1937 and provided some 130,000 birds for release over 84 counties until 1949. Cooperative pheasant rearing units, set up under Pittman-Robertson Project 1-D, raised 40,156 birds for release from 1939 through 1944.

While weather always plays a significant role in the reproductive potential and survival of the pheasant, land-use patterns are basic to the areas where pheasants have been able to abide successfully. Like any other living organism, certain requisites of food and cover are necessary. The pheasant, while highly adaptable, is generally found in highest numbers where approximately 20 to 45 percent of the area is in small grains and wild hay and less than 40 percent in corn and alfalfa. Where interspersions of cultivated lands and permanent vegetation exists, pheasants thrive.

Pheasant densities were plotted in 1969 as part of preparation for the State Wildlife Plan. Examination of this range map demonstrates well that pheasants are a product of agriculture. The south-central and southwest regions of the state have consistently been good areas of cover over the years. Soil-Bank vegetation which had contributed to some excellent pheasant numbers in northeast and central Nebraska during the mid-1960s was returned to cultivation with a subsequent decline in pheasant numbers by 1969.

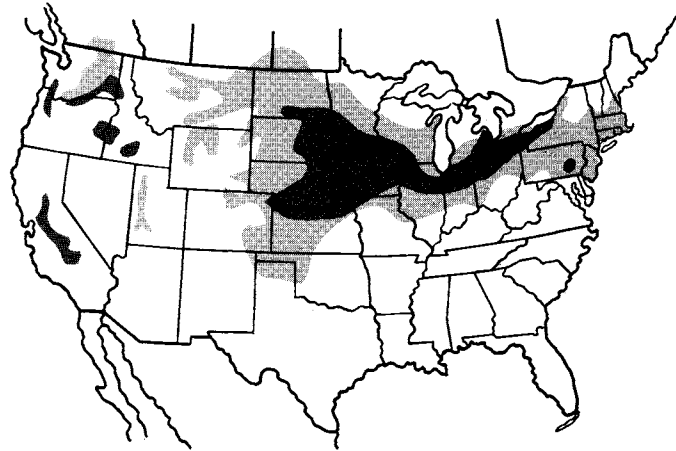
The highest local populations in the state existed in the high plains wheat country of Box Butte and Sheridan counties except during several years of severe blizzards. While winter cover is usually not a limiting factor in southern or eastern Nebraska, it has been deficient in much of the western areas. As a result, periodic storm losses have occurred—at least once in every 10 years.



In the Sand Hills region of the state, some interesting pockets of

# Pheasant Range and Abundance

## North American Distribution

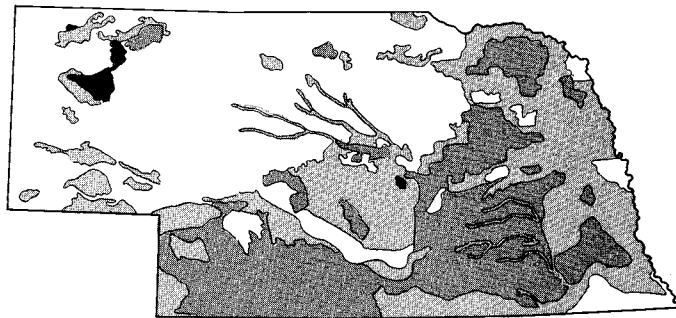
Since the pheasant's introduction, it has spread over most of our Northern states and southern edge of Canada. Its primary range begins in eastern New York, New Jersey and Pennsylvania, sweeps westward across the Great Lake states and ends on the western borders of North Dakota, South Dakota, Nebraska and Kansas. Notable pheasant populations are found in agricultural valleys west of the Rockies. Though not for lack of attempts by various game departments, the pheasant has not been established in the southeastern United States. The line separating good pheasant range from unsuitable range is remarkably sharp. Most biologists agree that warmer temperatures have a detrimental influence on developing pheasant embryos.







Best Pheasant Range   
 Fair to Medium Pheasant Range 

## Nebraska Densities

Almost all of Nebraska can be considered as possible pheasant range. Biologists estimate that that amounts to over 43 million acres, with approximately 13 million supporting moderate to high populations. The greatest single factor controlling pheasant numbers over much of the state is the availability of suitable nesting cover. Expiration of land-retirement programs like the Soil Bank, more intensive land use, and changes in road ditch management policy are major contributing factors to this decline in nesting habitat. Shortage of winter cover can be a critical factor in some years, especially in marginal pheasant range.



High—More Than 200 Birds Per Section   
 Moderate—50 to 200 Birds Per Section   
 Low—10 to 50 Birds Per Section   
 Scarce or None 

pheasants exist. As would be expected in an area of such unbalanced habitat, pheasant populations do not tend to have a great deal of stability. Greatest numbers are found near marshes, shelterbelts, streams, or small cultivated areas. In contrast to food habits of birds in the prime pheasant range of the state, Sand Hills pheasants are very much dependent on annual seed crops from native plants. Food items such as sunflower, grasses and ragweed become very important to the pheasant in this area of essentially non-cultivated land. Food-habit characteristics similar to prairie grouse are also observed in the adaptable ringneck of this region, with wild rose and poison ivy berries being utilized, particularly in the winter.

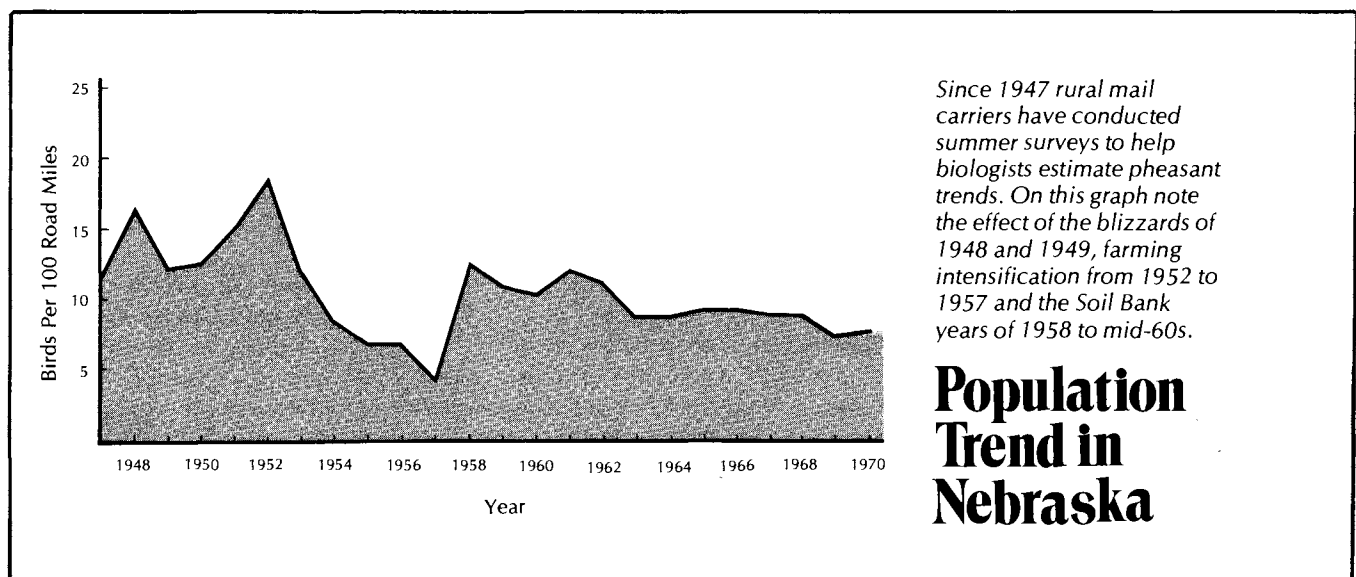
No game bird in the state is as adaptable as the pheasant, nor does any other game species have the reproductive capability of the ringneck. Yet, this capability to exist under the changeable and often harsh climate of Nebraska cannot ever be fulfilled to the sportsman's desire without the ecological requisites for survival. During the relatively short pheasant history in Nebraska, it has been apparent that even a small percentage of permanent cover means much to pheasant numbers. Soil Bank booms have come and gone, and the pheasant has fluctuated with these increases and decreases in

permanent cover. Where intensive irrigated farming has removed fence-rows, drained and leveled rainwater basins and narrowed roadsides, pheasant numbers have dropped. Spelled out from a game manager's perspective, every unit of land has a given carrying capacity. Where essentials like nesting and winter cover or winter foods are lacking, carrying capacity is diminished. Interspersion or diversity of cover types is also a key to estimating productive capability of pheasant range. A solid 640 acres of corn or grass would provide an abundance of food or nesting cover, but it most certainly lacks the needed niches of other habitat so essential for life needs.

Thus, like any other living organism, the pheasant is completely dependent on suitable habitat. However, cover that produces high wild-life numbers is often in conflict with agriculture or urban expansion. The short-term gains provided by modern-day land manipulation, though, often become predictable long-term losses. Many methods of habitat management and restoration can be wholly compatible with farm improvement practices and urban land development. Until realization and implementation of these practices become an actuality, the ring-necked pheasant's future in Nebraska will be a steady, but losing battle for survival.  $\Omega$



Nebraska's first pheasant season was held in 1927. It lasted only three days but saw the harvest of over 5,000 birds. The following year a 10-day season was authorized and over 35,000 pheasants taken.



Since 1947 rural mail carriers have conducted summer surveys to help biologists estimate pheasant trends. On this graph note the effect of the blizzards of 1948 and 1949, farming intensification from 1952 to 1957 and the Soil Bank years of 1958 to mid-60s.

## Population Trend in Nebraska



**W**ITH THE approach of spring, distinctive physical and hormonal changes occur in the pheasant. As the days get longer, the pituitary gland in the brain becomes active triggering the production of hormones which stimulate courtship behavior. Since the hen must cope with the rigors of mating, nesting, and brood rearing, she particularly undergoes significant internal change. She must have a reserve of energy to lay all her eggs and to produce the necessary heat to incubate them. Therefore, the hen attains her peak weight in the spring.

Courtship activities of ring-necked pheasants provide a springtime drama that is hard to top. A cock stakes his claim to a piece of real estate for courtship purposes. Within this self-claimed domain, he is a strutting, boisterous fellow who will tolerate no trespasses by other males. He has a one-track mind—girls—at this time of year, and his crowing proclaims to the pheasant world that this is his territory, that he is a great lover, and that he is the meanest bird on the “block”.

Crowing activity generally begins in late February or early March, becomes more intense during April and peaks in early May. In crowing, the rooster grasps an immovable object, stretches and emits his raucous crow, followed by a rapid beating of wings.

The second and most dramatic phase of courtship occurs after the hen is attracted to a cock's territory. The rooster approaches the hen, tilts his body toward her, spreads his tail feathers, and extends one wing downward. His head is held low with ear tufts erect and neck feathers flared. The lores or wattles on the sides of his head turn a vivid shade of red and swell until they nearly touch on top of the head. His yellow eyes appear vacant, and he seems to be completely ruled by the biological instinct to reproduce.

The drab-colored hen, too, has her role in the unfolding drama. Early in the season, she is a typical

coy female. She may appear to be totally disinterested in the ardent rooster's attempt to woo her. She may watch his antics, then continue feeding or walk nonchalantly around him. When that happens, the cock does his best to rearrange himself and continue his display. As the nesting season approaches, she becomes more attentive and may crouch by her selected mate as he displays.

Pheasants are polygamous, and a cock will gather as many hens as possible into his harem. The average harem, in Nebraska, includes three to four hens. However, it is not unusual to see a male with from 5 to 10 hens. The ringneck rooster is a virile fellow who is quite capable of mating successfully with a great number of females.

The ratio of females to males in the spring breeding population usually averages about two hens per cock. When compared with the average harem size, there's an obvious annual surplus of roosters which do not mate.

These “bachelor” birds tend to be a disturbing influence in the breeding population. They roam about picking fights and assaulting hens as they try to gather their own harems. These cocks, and many that were successful in acquiring a mate, are purely surplus to the reproductive needs of the species. A spring sex ratio of 6 to 10 hens per cock would be a desirable management goal. No poultry man would consider maintaining a rooster for every two hens in his flock.

Spring crowing behavior of the cock pheasants has provided biologists with a tool for estimating spring populations. “Crowing counts” are made along sample 20-mile routes in the various regions of the state. Starting 40 to 45 minutes before sunrise, technicians conduct the census by stopping in each mile and recording the number of cock calls made during a two-minute time period. The number of calling cocks, when corrected with sex-ratio data from roadside counts, provides an index to the population. The index is simply a figure that allows calculation of increases or decreases in

numbers from year to year and in no way indicates absolute numbers.

The population density of an area is related to the diversity of cover types existing on that locale. For example, more than 25 lagoons or rain basins were distributed on one nine-square-mile pheasant study area, while a second study area less than 15 miles away had none. The population on the area with the basins was consistently twice as high as the population on the second area. Since cropping patterns, weather conditions and soil types were similar, the differences in population were attributed to the presence of the lagoons.

Basins tended to break up large blocks of cover and provided a mixture of types that better meet the needs, and will support more pheasants. This interspersing of cover types is important to pheasants and results in greater numbers of birds on an area.

When the hen selects her mate, the courtship period ends and she must get on with the serious business of home selection and chick rearing. She must choose the nest site, lay and incubate the eggs, and brood the chicks after they hatch. She receives no help with these chores from the male. His duties end after mating takes place.

Early in the nesting season, the hen may seem rather careless about egg laying. Eggs may be dropped at random, with no attempt made to conceal them. Later she may play a stop-and-go game of initiating a nest, laying a few eggs in it, and then abandoning it. Frequently several hens will lay eggs in a single nest, termed “dump nests” by biologists. It is not uncommon for a dump nest to contain from 20 to 30 eggs.

Promiscuous egg laying by pheasants is not limited to dump nests. Pheasant eggs were found in nearly 7 percent of all duck nests checked on a study area in south-central Nebraska.

The most heavily parasitized nest found during that study contained three duck eggs and five pheasant eggs. The nest contained one blue-winged teal egg when first discovered and three teal eggs and

Photograph by Kent Olson



one pheasant egg at a later date. The hen teal abandoned her nest after the pheasant's intrusion and neither incubated the eggs.

As spring progresses, the hen ceases random egg laying. She quits practicing and becomes serious about establishing a nest.

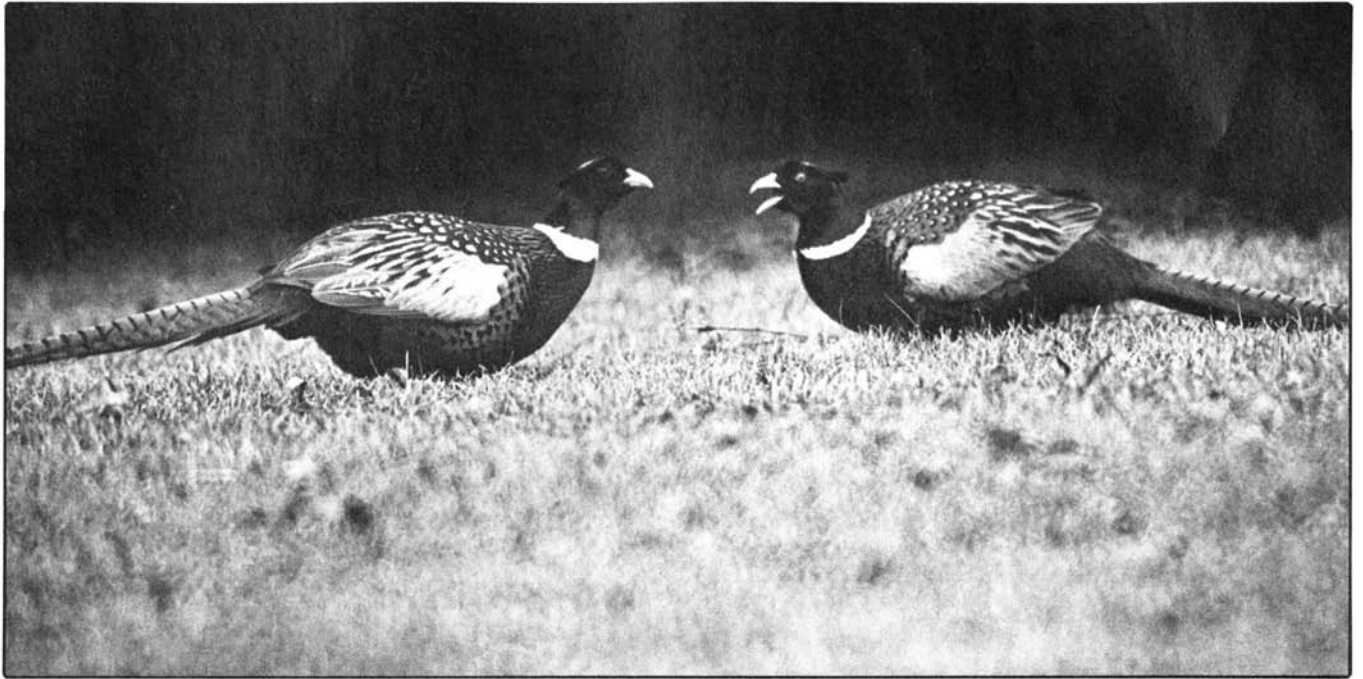
Pheasants are ground nesters, and the nest itself consists of a small depression which the hen shapes to her own specifications. It is lined with grass, leaves and other pieces of plant material. Down, feathers and

## Nuptial Rites and Nesting

*Spring recoups winter's losses*



Photograph by Greg Beaumont



Photograph by Mike Grode

additional vegetation are added as egg laying and incubation progress.

Nests are established in a variety of vegetation. Findings from a 10-year study on pheasant life history and ecology in south-central Nebraska indicated that hens preferred roadsides, wheat and alfalfa as nesting cover. Most of the chicks (approximately 77 percent) were hatched from nests in roadsides and wheat.

Roadsides are particularly important as pheasant nesting cover. While this cover type makes up approximately one percent of the total land area, it consistently produces more than 25 percent of all chicks hatched. This relatively high production from such a restricted area results primar-



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*The courtship activities of the ring-necked pheasant are a spectacular springtime drama. Crowing begins in late February and peaks early in May.*

*During this time, cocks vigorously defend well-defined territories, above. By late May, most hens have laid their clutches and are at the business of incubation.*

ily from the permanency of this cover type. Roadsides are not normally worked from year to year. Therefore, they contain residual cover as well as new growth. Generally, roadsides with well-developed, solid stands of warm-season native grass or smooth brome are not preferred types. Rather, hens select roadsides with an abundance of early maturing grasses such as western wheatgrass or bluegrass, mixed lightly with annual weeds.

Hen pheasants also show a definite preference for nest placement within the roadside profile. The bottom area is preferred as a site to establish a nest, followed by the slope adjacent to the fence.

While winter wheat is a major crop in south-central Nebraska, it is not a particularly popular nesting choice. However, it is productive. In a study in the region, approximately one-quarter of the land involved was devoted to its culture, and the crop provided more than half of the total available nesting cover. Still, nest densities in wheat (2 nests per 10 acres) were lower than in any other cover type. On the other hand, 24 percent of all nests were established in wheat, and about 53 percent of all chicks produced during the 10-year study were in this cover.

The harvest of wheat normally begins during the first or second week of July, which is well after the peak of the pheasant hatch. Hens which lose a nest and choose wheat as a site to re-nest may also be successful, even if the field is harvested prior to hatching of their clutch. Stubble is normally left high enough to provide sufficient cover for the nest, and many hens return to complete incubation after the harvest.

Predation of nests is also lower in wheat because the nests are spread over a larger area and because nest predators such as the striped skunk prefer to prowl strip cover such as fencerows and roadsides to large blocks of wheat.

Alfalfa must also be considered as an important cover type for nesting, even though few chicks are produced there because of mowing. Alfalfa greens up very early in the spring and is very attractive to nesting hens. Ap-

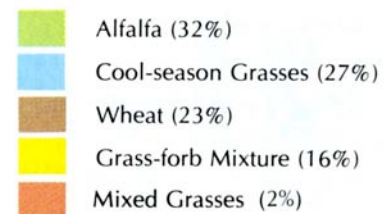
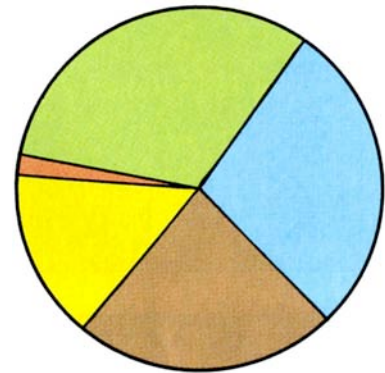
proximately 27 percent of all nests are located there. However, more than 95 percent of these are doomed to destruction by mowing, which occurs just prior to the peak of the hatch. In addition, these areas often become death traps for the incubating hen.

Changes in technology over the years also have made it more difficult for pheasants to utilize alfalfa. Machinery has progressed from relatively slow, horse-drawn mowers to tractor-drawn models to today's wide, high-speed, self-propelled swathers. Irrigation of alfalfa has also increased, allowing the man on the land to harvest his crop earlier. While all these advances have increased the efficiency of the farmer, they have been detrimental to old dame pheasant because she just cannot adapt. This does not mean that the farmer should return to horse-drawn mowing of alfalfa. That would not be practical or economical. Instead, game researchers must look for means of making other cover types more attractive than alfalfa and thereby reduce the loss of hens.

The history of agriculture in the central Platte River Valley graphically illustrates its effect on pheasant populations. The valley from Grand Island to North Platte formerly supported good ringneck populations, but the agricultural economy of the area is now based on two crops, corn and alfalfa. Alfalfa in that region is normally cut repeatedly during the summer and sent to dehydration plants. Chopping is often done on a 24-hour basis and few nesting hens survive. Most of the crops and native hay fields which formerly offered nesting cover in the river valley no longer exist. Consequently, one finds a much lower pheasant population today.

Other cover types used for nesting include pastures, native hay fields, marsh edges, and fencerows. Researchers were surprised to find that during their 10-year study, weedy and brushy fencerows produced no pheasant chicks. Many nests were found in this cover type, but not a single one appeared to be successful. Continued study revealed that such areas of cover served as regular

## Nest Site Preferences



*Nests are established in a variety of vegetation. Findings from a 10-year study on pheasant life history and ecology in south-central Nebraska indicated that hens preferred roadsides, wheat and alfalfa as nesting cover. Approximately 77 percent of all pheasant chicks were hatched from nests in roadsides and wheat. While alfalfa is preferred nesting vegetation, few chicks are produced there because of mowing mortality. Roadsides, with an abundance of early maturing grasses, are also preferred areas. Wheat, though it is not a preferred vegetation type for nesting pheasants, is one of the most productive.*





*Approximately 27 percent of all nests are located in alfalfa. More than 95 percent of these nests are doomed to destruction by mowing just prior to the peak of hatch.*

*Roadsides and waste areas are important nesting areas. Even though spring burning by landowners takes a heavy toll, these areas still produce about 25 percent of all chicks.*

travel lanes for several pheasant-nest predators. Thus, nests were easily found and provided many omelets for skunks, raccoons, and other such critters.

Careful examination of more than 1,700 nests revealed that hens also prefer certain groupings of plants within cover types as their nest site. Eighty-two percent of all nests were established in cover where the plants achieved maximum growth during the spring months. In other words, most nests were located in alfalfa, winter wheat, and cool-season grass stands such as western wheatgrass or bluegrass. Native warm-season grasses were seldom used by nesting pheasants.

This preference for cool-season plants by nesting hens was also demonstrated in a recent study near Grand Island, where 60 hens were confined in three, one-acre pens. These were each divided into one-half acre alfalfa and one-half acre of warm-season grasses. The 60 hens established 89 nests in the alfalfa and only 10 in the warm-season grasses. This indicates that hen pheasants can and do actively select certain plant complexes for nesting if those complexes are available.

Waterfowl in south-central Nebraska also exhibit a tendency, similar to the pheasants, to select cool-season plants for nest sites. Roadsides and alfalfa were preferred cover types, and alfalfa and cool-season grasses were preferred plant complexes within cover types.

Once the hen becomes serious about becoming a mother, she selects a nest site and begins laying at the rate of about one egg per day. The eggs are generally laid sometime between the morning and evening feeding periods. The hen does not remain at the nest except to deposit the eggs. The completed clutch may contain from 1 to 20 eggs, with an average of 10 eggs in Nebraska.

When egg laying in the nest has terminated, incubation begins. The hen began to shed feathers from her breast just prior to egg laying in preparation for this phase of the nesting cycle. As the feathers are shed, a bare patch of skin on the breast appears. This "brood patch" is well



supplied with surface blood vessels to keep the eggs at the right temperature for hatching.

The hen's attentiveness to the nest has also changed during incubation. During egg laying, she was a casual visitor who stayed only long enough to deposit her egg. Now she only leaves the nest for a brief period each day. She shows true devotion to the young developing within the eggs in her nest.

Pheasant eggs require approximately 23 days of incubation. During this period, the hen turns and readjusts the eggs frequently. Although the eggs were laid individually over a two-week period, incubation of all eggs begins at the same time and they all hatch within a few hours of each other.

When development is complete, the chick uses its egg tooth, a projection on top of the beak, to cut a cap off the large end of the egg. The new arrival emerges from the egg as a wet ball of fluff supported by spindly legs. Pheasant chicks are precocious, capable of leaving the nest soon after hatching. The hen will lead her new brood away from the nest as soon as they are dry.

Although pheasant chicks hatch from April through August, the peak hatching period occurs during the first three weeks of June. More than

60 percent of all chicks hatch during this brief period of time.

Reasons for nest failure or poor pheasant reproduction are always a topic of discussion among the barber-shop biologists. Factors most frequently discussed are weather, predation, and farming operations. Weather is the most variable of the environmental factors and one with little possibility of control by man. Only two weather factors, departure from normal precipitation and temperature, exerted an influence on nesting during the course of Nebraska studies. Deviation from normal precipitation was of primary importance, while abnormal temperature was secondary. Earliest hatching, which is usually more productive, occurred in years when spring was classified as warm and dry, while the latest hatches occurred in wet, cold years.

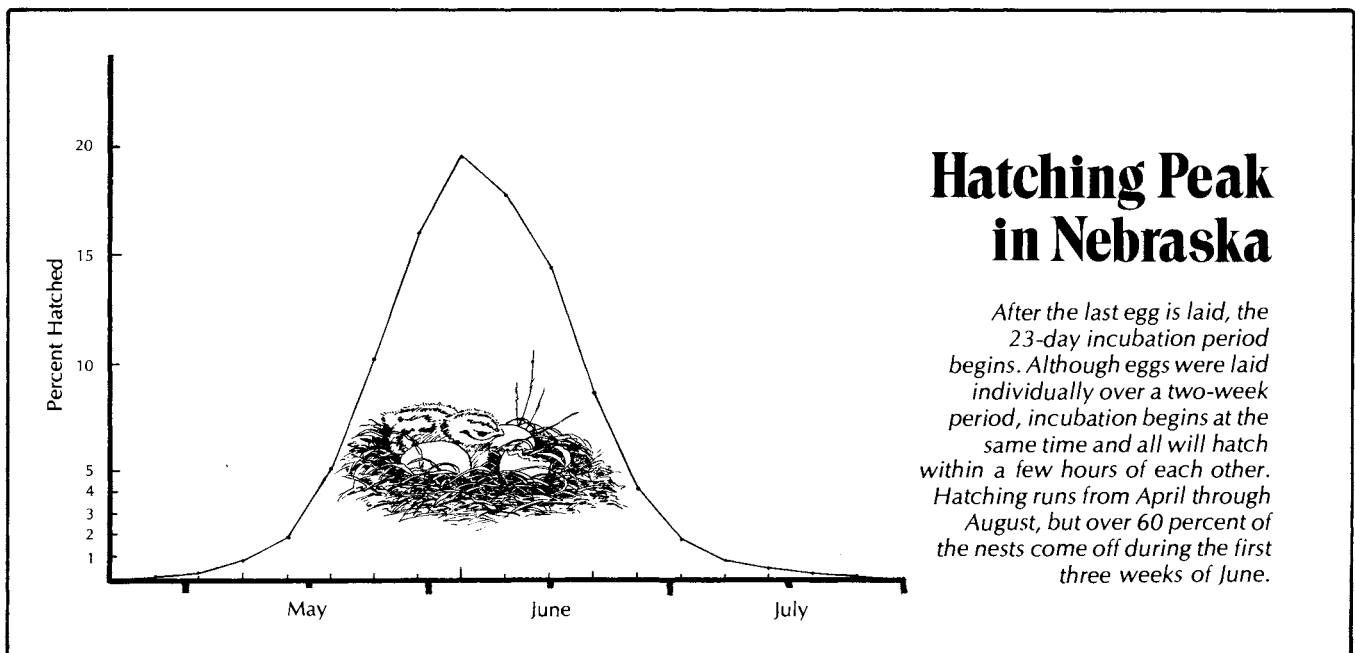
Most nesting failures can be attributed to three major factors—farming operations, predation, and abandonment. All three have varying effects from area to area and from year to year. Generally, when abandonment rates go up, nest failures from predation and farming operations go down, and vice versa. Generally speaking, years of high nesting success are also years with high predation rates.

Habitat as a factor affecting nesting success is a much discussed topic. However, the true importance of secure nesting cover is seldom fully recognized. Man can exert a degree of control over habitat and thus modify the impact of weather, predation, farming losses, and abandonment.

Fertility and hatchability are not problems in Nebraska's pheasant population. Examination of hundreds of eggs indicates that fertility consistently averages about 92 percent.

Nebraska pheasants are persistent nesters, and the hens do everything in their power to literally flood the fields with their offspring. Each hen in the spring population averages over three nests in an attempt to reproduce. In spite of this tremendous effort, only 48 of every 100 hens present in the spring successfully bring off a clutch of eggs.

Nesting season is the most important time of the year for pheasant populations. This is the season when old dame nature decides whether the harvest will be a boom or a bust. Pheasants are not noted for their longevity. The average life span of a Nebraska pheasant is less than one year, and few birds live to see two successive hunting seasons. The annual turnover rate in the population approaches 70 percent.  $\Omega$



## Hatching Peak in Nebraska

*After the last egg is laid, the 23-day incubation period begins. Although eggs were laid individually over a two-week period, incubation begins at the same time and all will hatch within a few hours of each other. Hatching runs from April through August, but over 60 percent of the nests come off during the first three weeks of June.*



# Summer Broods

*While cocks undergo their annual moult, hens enter the brooding period. For eight weeks, hens attend chicks*

**W**ITH THE advent of summer, nesting activities diminish and the hen enters the brooding stage of the reproductive cycle. Young chicks are highly susceptible to cold, wet weather and cannot survive repeated or severe exposure to these conditions. Therefore, the hen attends them almost constantly. She will normally remain with her brood until the young are six to eight weeks old.

One frequently hears comments about how good the "second hatch" is during a late nesting year. This misconception is caused by the hen pheasant's persistence in trying to hatch a brood. If her nest is destroyed or abandoned, she will renest time and time again until she is either successful or simply runs out of time. A hen that loses a brood will not re-nest. Broods of young pheasants observed in late summer or early fall are the results of renesting.

A look at the time required to lay a clutch of eggs, incubate them, and then rear the young will show that raising two broods in one summer is a feat that is next to impossible for a hen to accomplish. It takes the average hen 13 to 14 days to lay her clutch of eggs. She will then spend 23 days incubating them, plus another 8 to 12 weeks rearing the young. That totals a minimum of three to four months from start to finish. If a hen started her nest in early May, it would be August before she would be ready to start over. There is just not enough time for her to repeat the process.

In addition to the time factor, there are important physiological reasons why the hen will not rear two broods. Her behavior during each phase of the reproductive cycle is governed by a delicate balance of hormones in her system. Different hormones dominate the egg laying, incubation, and brood-rearing phases. Consequently, nature dictates that a hen which loses her brood will not re-nest, nor will she attempt to hatch and raise a second brood. She is physically and emotionally conditioned to brood by her hormone balance, and the cycle will not repeat itself until increasing daylight trig-



gers the response the following year.

One of the most difficult phases of managing or studying pheasant populations is the accurate censusing of broods. The summer census provides necessary information on the success of the preceding nesting season and of juvenile mortality. It also gives the data for setting hunting season regulations. Information on pheasant broods is collected in two ways—roadside counts by Game and Parks Commission biologists and the rural mail carriers census.

Roadside counts have been used to inventory pheasants in Nebraska since 1941. The method involves driving a standardized 30-mile route in mid-summer when weather conditions are favorable. Beginning at sunrise, observers leave a designated point and drive the route at approximately 15 and 20 miles per hour. All pheasants observed on the route are counted, aged, and recorded on standardized forms.

The Rural Mail Carriers Survey (RMC) is exactly what the name implies—a tally of game birds observed by the carriers along their regular routes. Nebraska's mail carriers are particularly conscientious and provide the Game and Parks Commission with a massive quantity of data from virtually every county in the state. This is a major advantage of this technique, since it provides extensive information on the entire state in a short period of time.

A combination of data from these surveys provides game managers with figures on birds per mile, birds per hundred miles, and young-per-adult hen ratios. All these figures can and have been used as post-breeding population indices that give a picture of population trends from area to area and from year to year. Regulations for the hunting season are, in turn, based on these trends.

The summer brood census also provides a means for measuring juvenile or chick mortality. As one might expect, there is a general trend for broods to become smaller as the chicks become older. By running the census route repeatedly and aging chicks to the nearest week, it is possible to determine the rate of mortality. From hatching until 6 to 10

weeks of age (the most accurate census grouping), approximately 35 percent of the chicks die. This figure remains quite constant from year to year. While we know that we are losing more than one-third of our chick population, this mortality is a phenomenon that is extremely difficult to document. Dr. Allen Stokes aptly described the scope of this problem in 1954 when he said, "The disappearance of so many thousands of chicks in the short space of a summer almost beneath one's eyes and

*A few days after hatching, chicks begin to replace their natal down with drab plumage. By the end of their first week chicks are capable of short flights, but throughout the summer they will depend upon blending with the environment for protection.*

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yet not noticed is a baffling experience and an enigma still to be solved".

Observations of a hen with young of two or more age groups is not uncommon in Nebraska. Hens will adopt chicks that have strayed from or lost their own mother. Approximately seven percent of all broods in south-central Nebraska consist of two age groups. This represents a minimum figure for brood mingling, because it is obviously impossible to tell if a brood of the same-age chicks is mixed or not.

Broods with more than one hen in attendance are also commonly observed in the summer. This may represent a mixing of two or more broods, or it may be that a hen has attached herself to another hen and her brood. A study at Sacramento Game Management Area showed that a hen pheasant would probably abandon her nest upon visual and audio contact with other hens with chicks. This may explain why fewer than half the hens hatch a clutch of eggs in intensively farmed south-central Nebraska.



*Immediately upon leaving the nest, day-old chicks begin feeding on summer's abundant supply of insects. They respond quickly to this protein-rich diet and when they are 13 or 14 weeks old, the juvenile birds may weigh as much as 1½ to 2 pounds.*

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Upon hatching, a pheasant chick will weigh slightly less than one ounce. Insects will make up the major portion of the chick's diet for several weeks, and it starts feeding immediately after leaving the nest. Chicks respond quickly to this protein-rich diet, increasing in size and strength. Both males and females demonstrate rapid growth from a little over half a pound at 5 weeks, to about 1½ to 2 pounds at 13 or 14 weeks, then growth is more gradual until adult weights are reached.

Along with changes in size and weight, the pheasant chick is also changing his plumage. Within a few days of leaving the egg, he begins replacing his natal down with drab juvenile plumage that is similar in both sexes. The primaries, or flight feathers, are the first real feathers to develop, and by the end of its first week a chick is capable of short flights.

Chicks undergo what is virtually a continuous moult during their first summer. They begin to replace their juvenile plumage with adult or post-juvenile plumage at about four weeks of age. Young cocks begin to show colored feathers on their breasts and necks at eight weeks. This final moult of the year continues until the chicks are about five months old. It is almost impossible to tell a 21-week-old bird from an adult on the basis of plumage alone.

Hen pheasants spend the summer months trying to hatch a clutch of eggs, if they were unsuccessful in earlier attempts, or in rearing their young. Hens also undergo their annual moult during this period. They are at their lowest weight of the year after egg laying and incubation, and

must use any reserve energy they have left to grow new feathers. There is some evidence that many hens cannot cope with all this stress and die. In fact, there are indications that summer hen mortality exceeds winter mortality.

Adult cocks are notably absent during the latter part of the summer. During late July and part of August, they undergo their annual moult and become quite secretive. It seems that the loss of his beautiful plumage is more than his ego can bear. So, in shame, he goes into seclusion until his new feathers have grown in.

Following a typical brood through an average day at monthly intervals during the summer would illustrate the variety of cover types utilized by ringnecks.

In late June, a hypothetical brood is about 2½ weeks old. There were nine chicks when they hatched on June 10 in a nest near a wild lettuce plant in a bluegrass roadside. Two chicks were chilled and died following a sudden thunderstorm shortly after hatching. In the false dawn that precedes sunrise, the remainder of the brood starts moving around the roost site in a patch of western wheatgrass along the margin of a marsh. They might also have spent the night in a roadside or pasture that had not yet been grazed. As the sun appears in the east, the brood moves into a pasture and starts feeding on insects. On another given morning, they could be found eating ground beetles, ants and other insects in a milo field.

At 11 a.m., when the sun is approaching its zenith, the brood heads for a nearby roadside. There, they spend the hottest part of the day in the shade of an osage orange hedge-row. Other broods can be found during this midday period loafing in a brushy fencerow or at the edge of a marsh.

The roadside where the brood is loafing is a good producer of insects, so they spend the late-afternoon feeding period right there. It was easier than moving back to the pasture across the road or to a sorghum field.

As sundown nears, the hen collects her young and moves them back to a patch of western wheat-

grass to settle down for the night.

The next observation is in mid-July, when the winter wheat has been harvested. The brood has been roosting in a stubble field for the last two weeks. There are only five chicks left, since two more chicks were lost when they contested the road right-of-way with a pickup truck. The brood is a little slower in leaving the field, for their diet now consists of plant material as well as insects. The roosting field contains abundant wheat seeds that the combine left, so they are in no hurry to get to the neighboring milo field, where they will spend the rest of the morning. They seldom visit the pasture where they fed a month ago, because that area has been grazed quite heavily and cover is sparse.

The brood has found a good weedy fencerow nearby to spend the midday period, taking life easy. Their cousins are using the neighboring marsh or roadsides, but the fencerow is a preferred cover type.

In the evening, the birds move in to an uncut alfalfa field that is loaded with insects and tasty greens. They don't come to this banquet in the morning to feed, because there is usually a heavy dew and they really hate getting their feathers wet. As darkness approaches they return to the stubble field and select their beds for the night.

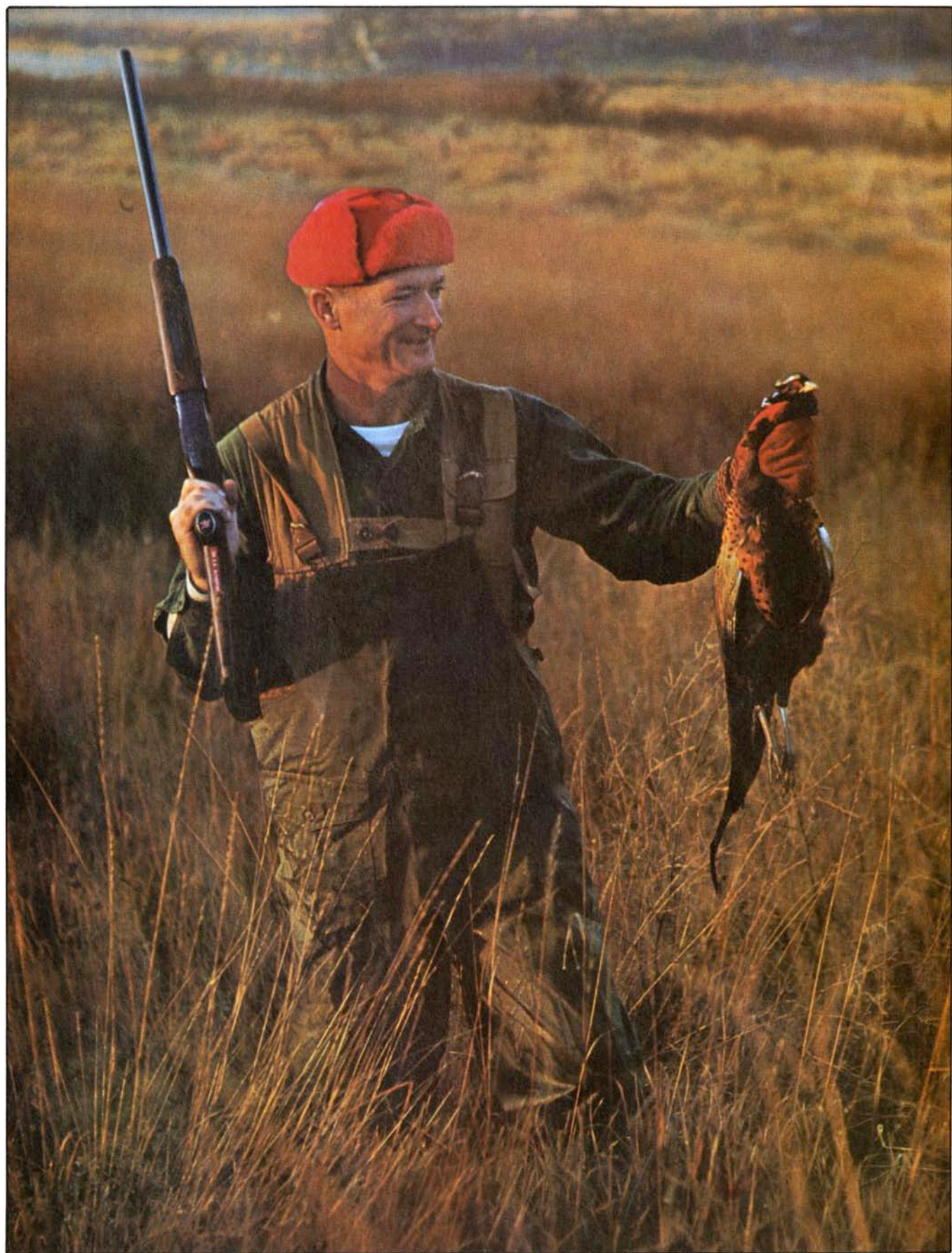
A final look at the brood comes in mid to late August. One can see quite a bit of color on the breasts of the young cocks as they move about. This brood, along with many others, is still using the stubble field for roosting each night. The western wheatgrass, where they roosted in June, has been hayed and is no longer used as a roost. Milo fields are maturing and cover is excellent. The brood elects to spend the entire day there feeding, loafing and dusting in the loose, cultivated soil.

The brood ends its day, like it has ended so many others in the last month, in the stubble field. Very soon, the young pheasants will disband as a family group. Fall is approaching, and during the next few weeks the young will begin to assert their independence and go their own way.

Photograph by Carl Wolfe









**W**ITH THE arrival of August, token hints of fall begin to appear. Ripening grain, along with the gradual change in plumage of the young cocks, make one realize that pheasant season is just around the corner. By mid-August, biologists' recommendations, based on summer brood surveys and field observations, are submitted to the Commissioners for setting of the season regulations. The opening date and season length are only procedures for the hunter who plans his outings from one pheasant season to another. To the motel owner and restaurant operator, the opening weekend of pheasant season means rush and confusion, but more business. Many eyes and ears wait for the official announcement of the Nebraska pheasant season.

Season setting, however, comes as no simple matter. Many weeks of data gathering by field biologists and conservation officers are only a fore-runner of the chore of last minute data tabulation. Results of regular brood surveys and field observations are prime data for digestion by the Commission and the public. Season recommendations by staff biologists take into consideration all factors of pheasant biology, for management of this top game bird is not only designed to harvest surplus birds and provide maximum recreation for the public, but also to provide a sustained resource for future years. With 40 some years of experience in pheasant seasons now under the agency's belt, one premise in pheasant seasons has been proven time and time again. That is: It's impossible to overharvest cock pheasants. The law of diminishing returns is demonstrated by the cock pheasant in a classic manner—at a certain level, coupled with a peculiar wily evasiveness, this tin-shingled refugee from a chicken yard will simply not be pursued further by hunters after a certain density has been reached. Such characteristics make the ring-neck the very desirable game bird he is today. If biological management were all there is to it, the Commission's job would be a cinch. But, the sociological aspects of pheasant

hunting provide another area requiring much consideration. It's often said that biologically, the pheasant season could run from September through March if only cock birds were legal. While this may be true, the landowner tolerance for such a season length would be limited. Further, the prestige and enjoyment of bringing home a gaudy trophy such as the ringneck would be diminished. For such reasons, then, the Commission finds that the biological problems attending the pheasant are small compared to the sociological problems of the hunting season. As in most democratic societies, compromise is the name of the game. And, in setting the season on the ringneck, an equitable arrangement for all citizens is strived for so that a portion of the surplus roosters can be harvested, recreational benefits can be enjoyed, and yet private lands will not be subjected to undue pressure from sportsmen.

During all this period of human activity and decision-making right on up to the opening hour of the season, summer-hatched pheasants have been growing, gaining weight and changing feather style. By hunting season, all but a few late-hatched cocks have acquired the resplendent copper bronze characteristics of the adult. Outward appearance, however, isn't the only change that is going on in the young pheasant. All the tricks of the adults and all the awareness of his surroundings have been continually honed to a fine edge as the weeks pass. The June-hatched pheasant has already

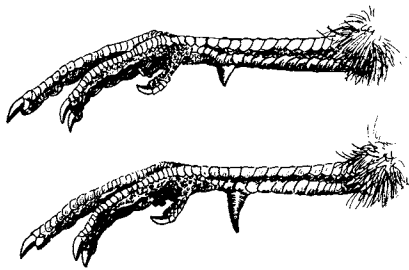
learned many of the tricks of survival passed on by countless generations of the past. Increased wariness is, after all, the one survival mechanism that allows this Asian refugee to make it year after year and to provide the sporting qualities which so many avid hunters find worthwhile.

For the pheasant hunter, novice or experienced, the first cloud-bound departure of a cackling rooster in the dim-lit sky on opening morning serves notice that this is one foe that will provide all the excitement and frustration that the average nimrod will want to tackle. If there is any relevance in the advantages of "psyching out" an opponent, there are many hunters at this juncture who see the writing on the wall. Their cause is lost, because there's no way that those knees which have suddenly turned to jelly, or those trembling arms will recover enough to get the sights set on this oriental invader before he's long gone from shotgun range. For this group of would-be pheasant hunters, a brief period of contemplation back at the car or farmhouse with a steaming cup of coffee might provide a chance to retrench. Or, it may be that the rugged contest with John Q. Ringneck just isn't the proper activity for the easily frazzled hunter.

Back in the field on opening morning, sounds similar to a small army are no indication of success. Even the veteran pheasant pursuer has found that there's always a new trick in the ringneck's escape maneuvers. There is probably no game bird on the continent that can crouch, hide, run or fly and do them all equally well as the pheasant. An understanding of some of these capabilities could assist any would-be pheasant hunter to at least get closer to his quarry.

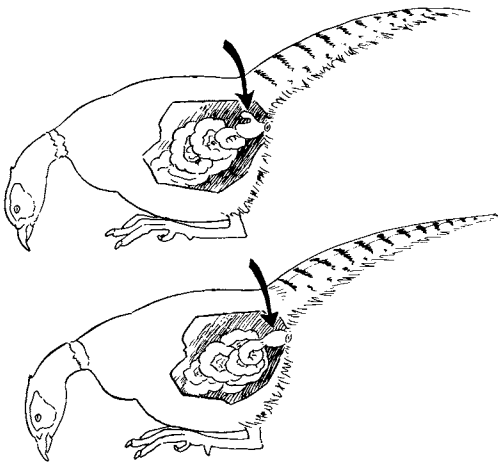
# Hunting the Ring-necked Pheasant

## Age Characteristics of Fall Pheasants



### Spur Length

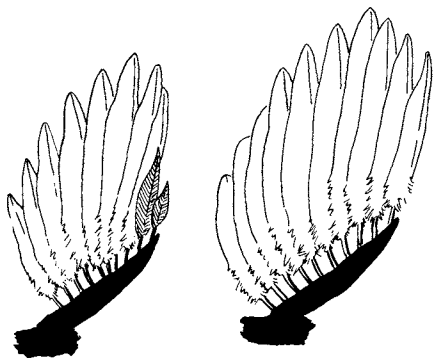
Young cocks are equipped with dull-colored, blunt spurs less than  $3/4$ -inch in length, above. Adult spurs are shiny black, pointed and over  $3/4$ -inch long, below.



### Bursa Depth

Biologists use the "Bursa of Fabricus" to age pheasants. The bursa is a blind pouch that lies on the upper wall of the cloaca just inside the vent or anal opening. As the bird grows older, the bursa decreases in size and may be completely lacking, below. The depth of the young-of-the-year's bursa is  $1/3$ -inch or more, above, of the adult cock  $1/3$ -inch or less.

### Moult of Wing Primaries



Primary feathers of the wing moult in orderly sequence, beginning with the innermost and progressing to the outermost. For example, the wing at the left is just getting its last two outer feathers, indicating that it is 16 to 17 weeks old. Adult birds, right, have all wing feathers fully grown.

Often overlooked is the ringneck's acute hearing. The slam of a car door or even the metallic click of a closing shotgun chamber are usually enough to send most pheasants scurrying for cover. During World War I, documentation showed that pheasants responded to cannon fire some 320 miles away—explosions inaudible to the human ear. Biologists have capitalized on this acute hearing ability at times as a census technique. Detonation of firecrackers at regular intervals along a census route during the spring allows a rough estimate of cock numbers, since most male birds respond to a loud noise by crowing. While crowing is not common in the fall, many a pheasant hunter has been surprised by a testy cock delivering a full-fledged crow following the discharge of a nearby shotgun. Human voices also have an excellent dispersal effect on pheasants, particularly during dry, calm days. The first maxim of successful pheasant hunting could well be "make no more noise than necessary".

The ringneck also possesses extremely good eyesight. Any object foreign to his neighborhood is enough to make most cocks shift into high gear in the opposite direction. The pheasant, unlike many mammals, is inherently spooky and takes to wing or legs upon any unusual intrusion. Any way the hunter can use cover to his advantage is an asset to successful pheasant hunting.

Flight is not one of the pheasant's best escape assets. But for a bird with such small wings compared to body size, he doesn't fare too badly. What is lacking in wing area is made up for with a more rapid wing beat. Once moving, a rooster pheasant hits between 35 to 45 mph. Couple this with an uncanny ability to go with the ever-present prairie wind and the pheasant becomes about as easy a target for the gunner as a will-o'-the-wisp. Most pheasants are not long distance flyers. Several hundred yards is about average. On occasion though, pheasants have been known to fly several miles. On landing, almost all hit the ground running. The pheasant's leg muscles are well adapted for such an evasive tactic,



and for the most part, this is the primary method for evading danger.

Many a hunter has experienced the frustration of seeing a rooster rapidly legging it down a corn or milo row, just out of gun range, and completely disappearing in a snap-of-the-fingers time span. Worse yet, many a hunter has watched his well-trained bird dog break all the rules of training and instinct and take off at a dead run after a high-headed, sprinting cock bird, after the torment of continually trying to point a moving bird just became too much.

The ringneck's constitution seems to go along with his extraordinary senses. An excerpt from John Madison's ode, *You Pheasant*, provides one of the best descriptions of this bird's capacity to survive:

You favor summers that raise  
fever blisters on rawhide  
And winters that jell your  
cussedness at forty below  
You get fat on a ration of  
bobwire and blizzard—

Ringnecks are rugged—no question about it. Each year many instances of healed legs and wings come to the biologist's attention. The pheasant has a tremendous capacity to heal breaks and wounds, and can often get by with the loss of feet, toes, and an eye. Early trapping efforts on the Valentine National Wildlife Refuge turned up 3 percent of the cocks with complete or partial loss of toes on both feet. Five cocks were blind in one eye, probably from fighting. Yet, all were within the normal weight ranges. In agricultural areas, the rate of injury is undoubtedly higher.

In spite of these characteristics that seemingly give the pheasant a charmed life from the hunter's viewpoint, there are a number of techniques that can be used successfully to assure bringing home more than just feathers.

At the beginning of the season, in particular, a lot of out-of-range shooting occurs. By holding back on the long, wild shots, the average hunter can boost his rating. Another tip comes after years of observing hunters in the field operating like Olympic contestants, as if working to break all time-distance records.

The number of cagey ringnecks they breeze right by is unbelievable. Nothing shakes up the average wily cock more than a slow, methodical approach to cover stomping. Often this is the only way to get one of these crafty birds to break cover. A zig-zag style of hunting, particularly in milo and corn, is not only effective on those holding tight, but goes a long way in breaking up the run-ahead, circle, and run-back tactics used by other pheasants.

Quick, accurate marking of downed game also adds to success. When a bird drops in heavy cover, keep your eyes on the exact spot as you move in. Better yet, insist that your hunting partners assume responsibility for marking a downed bird. By "homing in" on two lines of sight, the location is more accurately spotted and the search is shortened. If you're alone, drop a handkerchief at the spot where the bird dropped, then work around the spot in ever increasing circles. Take your time. Kick the cover and keep your eyes open. Often a brief pause is enough to make a smart old bird think he has been spotted.

Notorious for his ability to hide, a pheasant may often burrow into heavy cover, a drain, or an animal den. The careful hunter will keep an eye out for a long tail feather that looks out of place. Often the other end is attached to a sneaky cock who's making like a badger.

In those long milo and cornfields, a crippled bird often travels straight down the row without the usual crossing pattern. A careful approach to the field's end often produces the sought-after bird. But step light, and be ready.

If you're sure you've hit a bird but he doesn't fold or flinch, keep your eyes on it. In many cases, a fatally hit pheasant will set his wings and slant down on a long glide. Just before landing, the bird may fold up and drop like a stone. Mark the spot and the reward is often a bird which almost made the disappointment category.

It goes without saying that a good dog can provide additional hunting pleasure and at the same time be a definite asset in cutting bird losses.

The value of a dog in the field has been demonstrated not only in Nebraska but in many other states, particularly as a factor in reducing pheasant loss. A good working dog can be expected to cut lost birds by more than half.

Selection of the most effective dog for pheasants is grounds for endless debate. Based on field observations, a close-working dog with retrieving ability is going to come closest to filling the bill. Both Labrador and golden retrievers have proven worthy under Nebraska conditions. A pointer-retriever with sufficient mettle would have to include the Vizsla, German short-haired pointer and Brittany. Or, it may be that the 57-variety type, just plain dog is as effective as any.

From the standpoint of hunting techniques, a number of methods can be used with success, depending on the time of season and weather. Often overlooked but highly effective is very early morning hunting in wheat stubble. Of all cover types, wheat stubble is the pheasant's favorite haunt for roosting. Early in the season, careful and quiet movement into this cover just as morning light begins to show can provide excellent hunting. Overcast or drizzly days are especially good just as dawn is breaking, for the pheasant intensely dislikes moving from secure and comfortable cover. Good, rank wheat stubble can also provide some excellent dog work for the hunter who knows how to move in this cover. Again, a careful, slow, and methodical hunt will pay off in fast action. Often in the latter part of the season, wheat stubble can provide a bonanza late in the afternoon during heavy overcast or just before a storm closes in. For some reason, birds often respond to a falling barometer and will move into roosting cover early. As some hunters will attest, there's nothing as unnerving as having pheasants fly to you or over you, rather than

straight away. Under these infrequent conditions, adeptness at pass shooting comes in mighty handy.

For the average pheasant-hunting party, field driving is the most common method used to outwit the pheasant. Even here, good organization is a must. A widely spaced, straggling line of fast-moving hunters is going to get more exercise than excitement. A 20-foot distance between hunters is usually plenty; in weedy milo stubble, 10 feet would be better. Again, zigzagging in a slow, methodical fashion will move birds ahead and put them within gun range out front rather than behind and beyond the reach of anything but anti-aircraft weapons. Blockers, for maximum effectiveness, should move into position slowly, quietly, and without being conspicuous.

As the season progresses and crops are harvested, the pheasant still retains his early morning and late afternoon feeding habits, but begins to spend more of his loafing time in heavier weedy pockets and fence-rows unless the crop field is particularly rank. For the lone hunter or twosome, there's probably no cover to compare with a good weedy fence-row, and there's no method so effective for ringneck hunting as moving quietly along such cover with a shotgun poised at ready. Anytime between 10 a.m. and 2 p.m. is fine for this type of hunt, for during

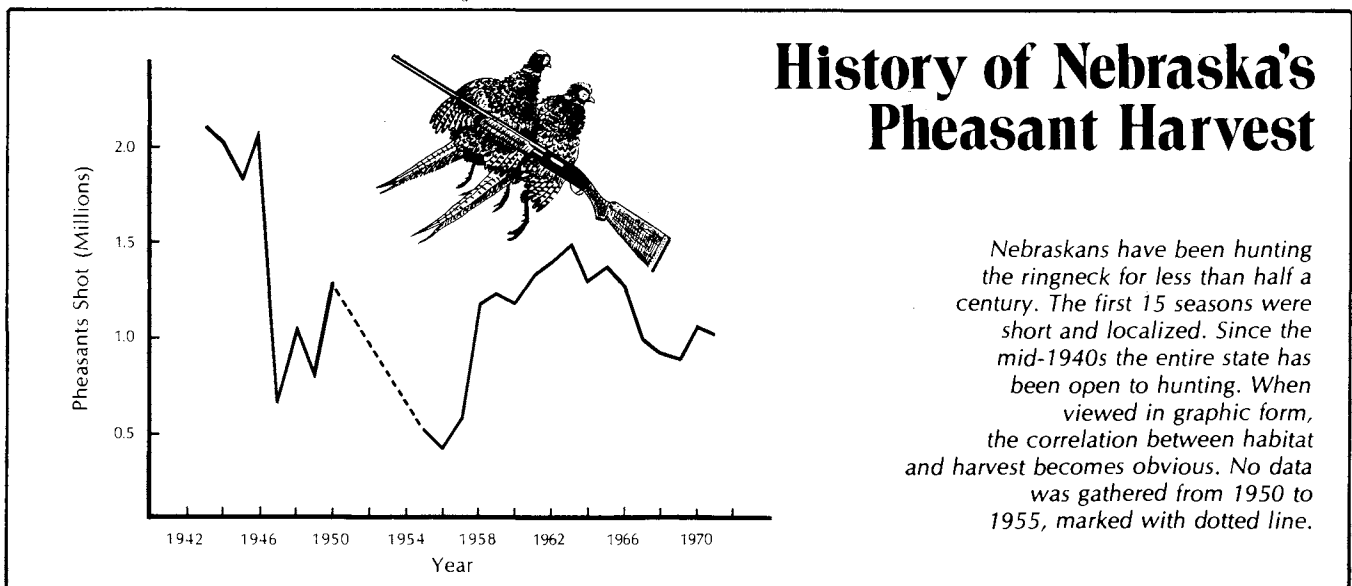
this period pheasants are going to be loafing. Fireweed, ragweed or sunflowers are among preferred vegetation. Weedy fence-rows bordering milo or corn are choice areas, particularly on the south side, where the birds can soak up sunlight as the autumn days shorten.

The first few Plains snowstorms put an altogether different kink in pheasant-hunting tactics. This can be a time when the usual hunting techniques either go down the drain or work with great success at least once. Snow seems to add new dimension to the pheasant's sensory perception and provides some new magic for his usual bag of tricks. Some hunters swear that the closest approach to a bird at this time will still put him as a speck disappearing over the horizon. Others, by learning their quarry's habits, find it easy to put birds in the bag. First snows seem to catch birds off guard for a time. The hunter who concentrates on small weed patches adjacent to grain fields can usually find birds. Midday hunting is often the most productive time for these outings.

Shelterbelt hunting comes into its own with snow on the ground. Food and cover are requisites for survival on the Plains. Taking advantage of the pheasant's proclivity for shelterbelts, particularly in the western part of the state, can provide some fast field action.

Under blizzard or heavy snow conditions, tracking pheasants provides a different but often productive hunt. Ambling along a set of fresh tracks is special fun for the young hunter, for very often a youngster gets so involved with the tracks, the pheasant is momentarily forgotten until an explosion of snow and a skyward burst announce the departure of the stalked. This is a time, too, for remembering that pheasants like to burrow into cover, but it gets pretty hard to pull in and cover two-foot trailing tail feathers with snow on the ground. And, many an old rooster has gone to that great cornfield in the sky as result of telltale feathers showing from a snow-covered clump or fireweed plant.

Regardless of which hunting technique is employed, any dyed-in-the-wool pheasant hunter will be hard pressed to explain just why he subjects himself to the discomfort of cold, heat, rain, and snow for an average of 4 to 6 hours; to the humiliation of realizing that 2½ pounds of feathered roughneck disguised as a game bird can consistently outsmart him; and to discover that he could have bought 4 to 5 times more porterhouse for the equivalent amount of time and money spent on hunting pheasants. In the pheasant hunting game there can be no explanation. No one can ever place a monetary value on the





thrill of seeing such sights as a young hunter racing back with his first ring-neck; a four-footed hunting companion locked-up tight in a classic point, or simply the sight of dozens of birds breaking cover.

The excitement and anticipation of ringneck hunting in the wide open spaces of Nebraska touch many, be he a young hunter who has faithfully followed his dad during previous seasons and anxiously awaits his chance to pit wits against a wild cackling cock, or a crusty old veteran who daydreams through the spring and summer of pheasant hunts long past.

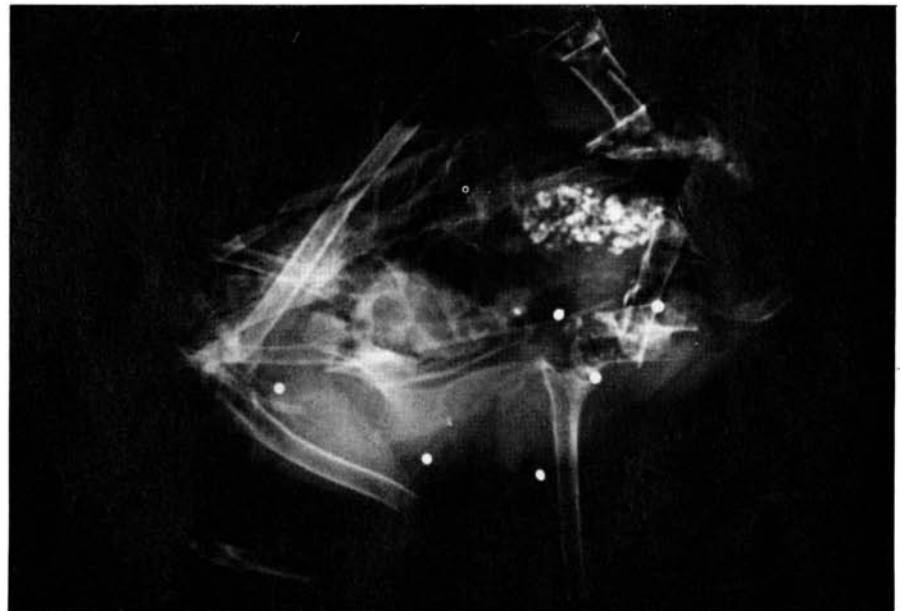
To most people, it comes as a complete surprise that Nebraskans have only been hunting the ring-necked pheasant under seasons for less than 50 years. The first season opening in 1927 allowed a 5-bird bag in Wheeler and part of Sherman County for 3 days. Since that time, many changes have taken place in the regulations governing pheasant hunting. Most noticeably, the season length has become longer and the opening date has gradually shifted later in recent years to a November kickoff.

While different areas of the state may have had different bag and possession and season lengths some years, the entire state has, for the most part, been open to pheasant hunting since the mid-1940s. Looking back over the statistics, it is interesting to note that total hunter trips for several years in the 40's are comparable to those tallied in recent years. Of particular interest are 1943, 1944, and 1945 when the statewide harvest was over 2 million birds. Like other states in the nation's prime pheasant range, those days are gone.

Modern-day managers predict that the pheasant will continue to furnish unparalleled thrills for many seasons to come, but will never be available in the numbers experienced some 30 years ago. Since those peak years, Nebraska's pheasant harvest has undergone some significant changes. In 1956, the annual harvest plummeted to the lowest on record, 369,000 birds. Since then, harvest figures have gradually recovered to what appears to be an annual aver-

*Each year many instances of pheasants with mended legs and wings come to biologists' attention, like the two fused humerus bones below. Three percent of the cock pheasants examined during a north-central Nebraska study were found to have complete or partial loss of some toes on both feet, yet all were of normal weight and in good health.*

*Each season some hunting pressure falls on hens even though they are protected by law. Some are mistaken for cocks, others are shot deliberately by thrill hunters. Biologists determine the degree of hen mortality by using fluoroscopy to establish the incidence of lead shot in carcasses picked up in the fall (bottom photo).*



## *A working dog can be expected to cut the number of birds lost by one half*

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age of somewhere around a million birds.

Over the years, hunting pressure or distribution of hunters has provided for considerable discussion. Through hunter check stations and surveys, information on these aspects has been obtained by Game Commission technicians.

During the early 1940s, Wayne and Madison counties were by far the top pheasant counties of the state. By 1946, a southward shift to Fillmore, Clay, and Hall counties became apparent. A shift back to the northeastern counties was noted in 1949, but after this, emphasis again shifted to the east and south-central portions of the state.

While hunting pressure may appear very high in the eastern third of the state, particularly on opening weekend, a number of far western counties also sustain high hunting pressure simply because of their more limited pheasant range. In Scotts Bluff County, for example, almost all the pheasant range is concentrated in the cultivated areas along the North Platte Valley. On a unit basis, there is probably as much pressure on these lands as in the most heavily hunted eastern counties.

Check stations, operated during the opening weekend at various locations over the state in recent years, provide a good insight into what the total harvest might be. The average number of hours required by a hunter to bag a bird has been a good indicator of what the season has in store. Over the years, this unit of effort has followed the harvest very well. In 1968, for example, the average hunter needed over 6 hours to bag a bird and the total harvest was below 900,000. While the hours of effort drop, it is usually a good indi-

cation that the pheasant harvest will be high. Less than 4 hours per bird in 1963 saw some 1,461,000 birds brought home by Nebraska pheasant hunters.

Check stations also yield information on hunting pressure. It has been observed over the years that resident hunters respond very quickly to changes in pheasant populations. During the late 1950s, south-central Nebraska was a favored area with pheasant hunters. By the 1960s, pheasant numbers had dropped in that region, but were offset by booming populations in the central portion of the state—particularly Custer County. With the demise of the Soil Bank program, pheasant numbers took an abrupt tumble. During all these population shifts, however, the resident has been very aware of such changes and has changed his hunting habits accordingly. The average nonresident, on the other hand, often lags behind population shifts by a year or so. It is assumed that the out-of-state visitor is also more a creature of habit. If an area furnishes reasonable hunting during one season, he often returns to the same area year after year rather than shifting his effort to areas of higher bird numbers.

The final tally of how the hunter afield has done during the season is accomplished by a survey. This survey questionnaire samples a random five percent of the resident hunters who purchased small-game permits. In 1970, some 7,600 hunters were sampled, providing valuable biological information. While about 62 percent of the harvest took place in the eastern third of the state, hunters in the Panhandle and Southwest areas had the best individual success. Looking back to 1959, only about 40 percent of the harvest took place in the eastern third. The highest success areas in the Panhandle and Southwest have remained pretty much unchanged over the past 10-plus years.

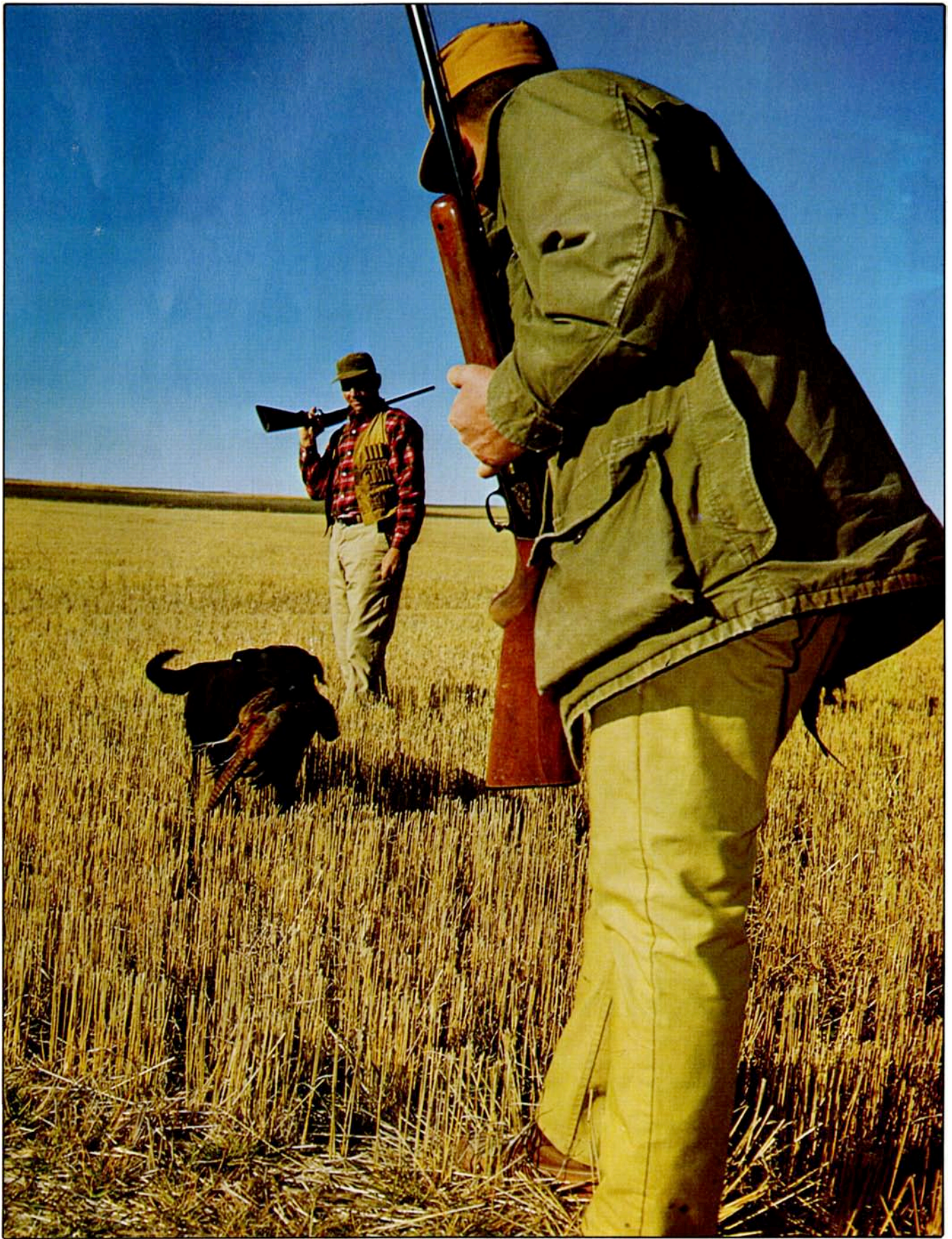
Harvest data also gives a graphic picture of hunters' habits and just how far they will go to pursue their sport. Findings during the 10-year pheasant study showed that non-local hunters were willing to drive at least 50 miles but not more than

150 miles to hunt. It follows, therefore, that the eastern third of the state will continue to see far more hunter activity than the western portion, simply because of population distribution.

Over the years the contribution of the nonresident pheasant hunter has come in for heated debate. Numbers of "foreign" hunters are very visible to the resident hunter or landowner. Good information on the nonresident was collected on the pheasant study areas in Clay and Fillmore counties from 1960-64. The average nonresident hunting party numbered about four, while local hunting parties were comprised of just slightly more than three. The nonresident emerged as a more effective or dedicated hunter than the resident. His success rate on the study areas was better, requiring about 4 gun-hours per bird as opposed to almost 6 gun-hours per bird for the resident (in 1964). Information gathered in 1966 from a special survey of nonresident hunters would tend to confirm findings from the study areas. Nonresident hunters averaged 1.76 birds per day as opposed to the resident who averaged 1.0 per day in the same year. The majority of nonresidents hunted in east-central Nebraska, where 42 percent of the hunts and 40 percent of the harvest occurred.

A limited survey during the 1964-65 hunting season gave some interesting insights into nonresident participation in Nebraska pheasant hunts. The average nonresident drove 113 miles from his point of entry into the state to a place to hunt. Over 60 percent drove from 50 to 100 miles during their daily hunting activities. The average nonresident spent 3.2 days in the state, and over 40 percent planned to make more than one trip. Some 11 percent made 5 or more trips just to hunt pheasants. Tallying estimated expenditures for fuel, food, lodging and miscellaneous saw nonresidents spend an estimated \$2,192,500 during the 1964-65 season with an average expenditure of \$83 per hunter. The ringneck in Nebraska is big business no matter how you slice it, or chase it. Ω







Photograph by Phil Hutchinson



*Nebraska's winters test a  
pheasant's mettle,  
but given good cover  
and an adequate food supply,  
the ringneck is almost  
impervious to the elements*

## **Season of Testing**



**C**HANGE IS the one thing in nature that is sure to occur, and the fall season inevitably yields to winter. The sun warms the earth for a shorter period each day, and autumn's bright colors turn to grey as icy winds sweep the Nebraska prairie. Winter rules supreme and locks the state in her cold, iron grasp.

Pheasants have been preparing for the fickle mood of nature for several months. They have been putting on weight through the fall months to enable them to withstand the rigors of winter. Fat reserves are built up for emergency use during periods of extreme temperatures and snow cover. They move from summer homes to winter cover with the first hints of a change in the weather.

During winter, Nebraska pheasants prefer marshes, plum thickets, bushy cover undergrown with weeds, shelterbelts, woody ditches, bushy fencerows, or railroad rights-of-way. One essential for survival during the cold months is high-quality ground cover.

At this time of year, pheasants almost always segregate by sex. Hens are more tolerant of crowding and generally gather in larger groups. Roosters exhibit opposite tendencies and are inclined to roost in small groups or as singles away from the hens. Thus, the old wives' tale that "with all these hens there has to be a rooster close by" has led many a winter hunter on a useless chase.

Winter weather can have particular impact on pheasant populations in localized areas. There are two major threats to a ringneck's survival during a severe winter—starvation and freezing.

The ring-necked pheasant is a tough character who is well adapted to Nebraska's winters and seldom succumbs to starvation. This bird doesn't need pampering when it comes to his winter food supply. He is quite capable of fending for himself without handouts. In fact, during really tough times, the pheasant can go without food for several weeks and live off the stored energy reserves in his body.

Corn and milo are the staples in

the pheasant's diet in agricultural regions of the state. Using a combination of feet and wings, they have been known to dig through a foot or two of snow to get at grain. If pheasants can't find grain, they do just fine on a diet of weed seeds, fleshy fruits, and vegetative parts of plants. If these sources fail, they may simply move into a farmyard and feed with domestic stock or follow a manure

*Pheasants caught away from cover during severe blizzards face into the wind to keep snow from penetrating their feathers. Many die from suffocation when ice clogs their nasal passages and mouths.*

Photograph by Curt Tvedt



spreader and glean the waste grain.

The pheasant is big and smart and is generally resistant to death from starvation. However, he finds it difficult to survive blizzards without adequate shelter. Pheasants caught away from good cover when a blizzard strikes often die either from freezing or suffocation.

Pheasants caught in the open face into the wind to keep snow from penetrating their feathers. Their nasal openings become covered with ice, which causes them to hold their beaks open to breathe. Ice balls then block the mouth and the birds suffocate.

Freezing presents another very real danger for a pheasant caught in inadequate cover when a blizzard strikes. Wind forces snow under the feathers where it is melted by body heat. As soon as it melts, the wind and sub-zero temperatures may cause it to refreeze, and the bird becomes cased in ice. With the insulation of his plumage lost to the wetness and ice, the bird loses his body heat and dies.

Fortunately, adverse weather conditions like blizzards do not occur frequently, nor do they generally last for long periods of time. Bird losses are normally restricted to those small areas where good cover is lacking.

Nebraska's winters may test a pheasant's mettle, but given good cover and adequate food, he is almost impervious to the elements. Pheasants have been seen digging their way out of 3 to 4-foot snowdrifts in a roadside after a severe storm. The birds literally popped out of the snow like jacks-in-the-box. A fireweed patch in the same storm looked like one big snowdrift, but underneath what appeared to be nothing more than a pile of snow, the birds had a complex tunnel system that puts some superhighway systems to shame.

The ringneck is well adapted to Nebraska winters, and he has no intention of quietly fading from the scene. He is a fighter and survival is his middle name. Given a chance, he will ride out the worst that winter has to offer. Ω

Photograph by Greg Beaumont



Photograph by Bob Grier



# Methods of Management

**A** YEAR in the life history of the ring-necked pheasant has passed in review. However, like a complex jigsaw puzzle that is not complete until the last piece is fitted into place, a picture of the pheasant is not complete until the management of this bird is locked into place.

Pheasants are a “renewable” natural resource—a product of the land that can be “harvested” like any agricultural crop. If not harvested, it will be lost. Nature will take this unharvested crop in much the same way she takes an unpicked fruit crop. Pheasant populations have a high turnover rate whether hunted or not, and unfortunately they cannot be stored for future use like grain in a bin. One might consider the harvest as the goal of a management program. However, because of the nature of this bird, game managers prefer to look on the gun as a management tool.

A brief review of the life history of the pheasant will show that there is a sound biological basis for harvesting male pheasants. Pheasants are a polygamous species, and the removal of 90 percent or more of the cocks has no effect on reproduction. Such a level of harvest has never been attained on a statewide basis in Nebraska. Even though Nebraska hunters have taken close to a million birds each of the last several years, the resource is underharvested. The number of birds shot could be increased by 60 to 90 percent and still not harm the population.

The harvest of hen pheasants is also biologically sound under certain circumstances. If the number of hens in the spring population is higher than the number required to produce the maximum number of young that can be raised in an area, the excess hens are surplus and could have been removed during the preceding hunting season. Nebraska research has shown that approximately 50 percent of the hens actually are successful in hatching and rearing a brood. Thus, about half of the hens add nothing to population replenishment.

Further studies were conducted to determine the effects of removing a



certain percentage of hens from a population before the breeding season. For 3 years, approximately 20 percent of the spring hen population was removed from a 9-square-mile study area prior to the nesting season. No adverse effects on reproduction could be detected.

Harvest of hen pheasants is a topic guaranteed to stir up a heated debate even among pheasant biologists. On the one hand, the pro-group maintains that even though the sexes can be easily differentiated in pheasants, a surplus exists that is being wasted each year. They also point out that in other game species, such as grouse and quail, the surplus of both sexes is taken without apparent damage to the population. The opposition looks at the hen as sacred, and to shoot them is like killing the goose that lays the golden egg. They maintain that even though there is a surplus of hens, conditions may become more favorable for reproduction and that we should have a maximum number of hens to take advantage of any increase in the carrying capacity of the land. They also question the ability to regulate the harvest, so that only the surplus and no more hens are taken.

Both the pro and con groups have some valid points. Each can and does make a strong case for its position.

Nebraska has allowed a hen in the bag in past years. Results of hunting surveys indicated that hunting pressure on hens was light. The harvest of hens was not overly popular with a large segment of the general public and was dropped. In any case, there should still be more attention given to the underharvest of cocks.

Season length is another aspect of pheasant hunting that concerns many sportsmen. They are afraid that the long seasons will result in an overharvest of cocks and that there would not be enough males to breed hens and assure egg fertility. Such fears are unfounded, for Nebraska hunters only take about 60 percent of the cocks, and egg fertility is consistently over 90 percent.

Pheasant hunting is self-regulatory and governed by the law of diminishing returns. Most (over 70 per-

cent) of the harvest normally occurs during the first 9 days of the season, with the greatest number of birds taken on the opening weekend. Cock pheasants learn fast, and the harder they are hunted the more difficult they are to get. As the population is reduced, it takes more and more hours of effort to bag a bird. The law of diminishing returns exerts its effect at the point where hunters simply will not expend further effort in pursuit of their quarry.

Lengthening the season adds few birds to the total harvest, but it does offer a greater recreational opportunity to the sportsman. And, that's what it's all about.

Any discussion of pheasant management will eventually turn to stop-gap measures such as stocking, winter feeding, and predator control. They have been described as three of the sharpest thorns in the pheasant manager's side. Such programs divert a conservation agency's limited economic resources and manpower while providing few tangible results. However, programs of this nature are often quite popular with the hunting public.

Americans are an impatient people who want immediate action to obtain their goal. Since Henry Ford first introduced the concept of mass production, we have attempted to produce desired products, including pheasants, on an assembly-line basis. The stocking of game-farm-reared pheasants is a dramatic though questionable action program to give nature a hand and mass produce this bird.

Most people do not differentiate between introductory stocking and annual maintenance stocking. The purpose of introductory stocking is to establish a new species in an area that will provide suitable habitat. Maintenance stocking is an artificial means of trying to maintain the population by releasing game farm birds. Maintenance stocking does not recognize that there are natural phenomena which govern population levels in an established population.

The pheasant is well established in Nebraska, and the present popu-

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*Effective management of any wild species must involve the manipulation of habitat to insure its abundance and the maintenance of its numbers at a level compatible with other land uses. In the case of the ring-necked pheasant, the latter includes balancing the number of hunters with landowner tolerance. It is, in effect, the management of people.*

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lation originated from a small introduction of approximately 1,000 birds over a 10-year period. This immigrant found a suitable home and did his best to fill it. In the brief span of 21 years, the population climbed to approximately 4 million birds which is an average increase of 190 percent a year. And this was prior to the opening of the game farm at Norfolk. The reproductive potential of this bird is truly amazing, and Nebraska's introductory stocking has to be classified as a huge success.

Maintenance stocking, or stocking where a population is well established, is next to useless since natural laws govern pheasant populations. A given unit of land has a carrying capacity or maximum number of pheasants that it will support. This carrying capacity is determined by environmental factors and changes from season to season and year to year. Pheasants produce more young each year than the land will support, to insure survival of the species. These extra birds are doomed, and the addition of game-farm birds simply adds to the surplus.

Wholesale stocking of pheasants for this type of pump priming is a high-cost business that shows a very low return. The Game Commission stocked approximately 170,000 pheasants between 1937 and 1949, but less than 2½ percent of these birds were bagged by hunters. The average cost of each bird harvested was approximately \$16 or roughly \$6 per pound.

The highest return of stocked pheasants recorded in Nebraska occurred on the Clay County research area. Those birds were released in

an area where hunting pressure was high. Although some of those birds were released just prior to the hunting season, only 36 percent of them were harvested, at a cost of approximately \$6 each. Several hunters who did bag some of the birds had some caustic comments about their sporting quality. It seems that many of the stocked pheasants were not overly afraid of the hunters. Several moved slowly in front of them, others just stood and watched them.

Regardless of the sporting quality of the birds stocked, it is obvious

that the costs of this type of action program are prohibitive. It is also apparent that costs of rearing pheasants have increased substantially since the 1940s. Stocking requires the license fees of several hunters to provide an extra bird for the select few who happen to bag a stocked bird.

Biologists have often been told by very sincere people who wanted to increase pheasant numbers that the Game Commission should stock hens in the spring before the breeding season begins. This might be a

justifiable program, if there were no hens in the area. However, in Nebraska fewer than half of the wild hens successfully hatch a clutch of eggs. The addition of game-farm hens simply adds to the surplus already present in the population, although the theory was not dismissed by the Commission without a test. Prior to the breeding season of 1956, Game Commission technicians released enough hens to triple the spring population on an area. Even so, nesting studies showed that the chick population did not increase. It was also noted that the costs of holding the birds until spring before release approximately doubled the cost.

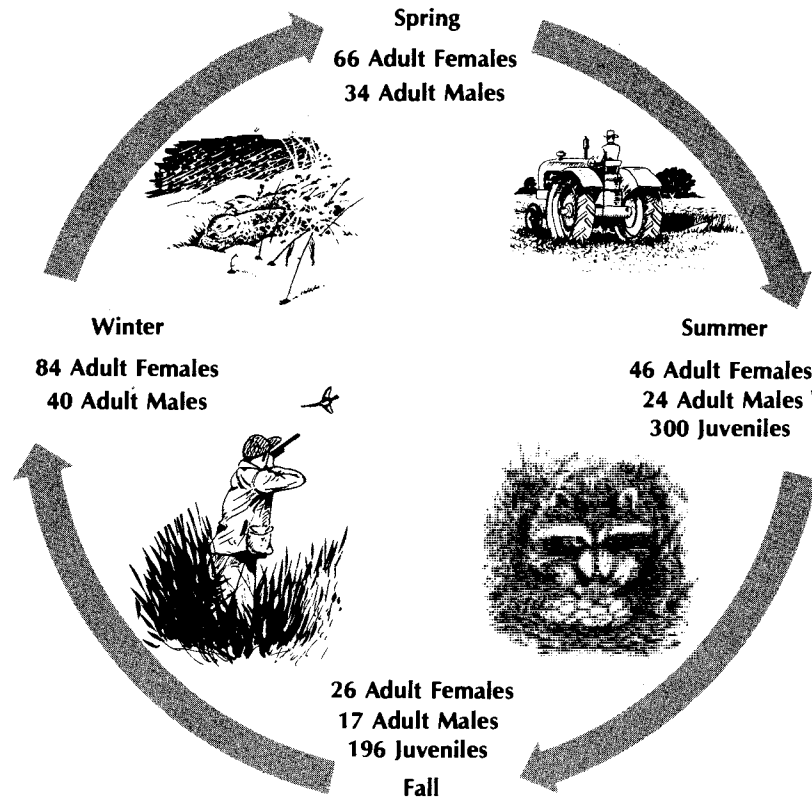
Pheasants have been in Nebraska for nigh onto 60 years, and during that time natural selection has produced a bird that is wary, relatively disease free, and well-adapted to the climate. The risk of introducing disease or inferior genetic strains into the population by stocking is high, and it becomes a legitimate biological question on this basis alone as to whether stocking is justifiable. Farmlands have been and will continue to produce pheasants for a long time without a brooder house in the background.

Nebraska is a state that is characterized by great extremes in climate. Severe winter storms or blizzards are not uncommon. During extremely harsh winters, one often feels the need to feed the birds to get them through the winter. Like stocking, winter feeding is a stopgap measure that is quite expensive in terms of time and money, while providing few benefits for the pheasant population.

This bird is a rugged character who can fast for long periods, dig through deep snow drifts for grain, or move into farmyards for a free meal. Winterfeeding programs are based on human emotional need to do something, rather than a physical need of the birds for supplemental foods.

In spite of the good intentions which prompt such projects, most winter feeding programs are failures. Grain is generally distributed in areas where humans have easiest

## Population Dynamics



Depicted above is an annual cycle beginning with a population of 100 adult birds in the spring. Thirty adults are lost before the nesting season ends, many to mowing operations. Even though only 50 percent of all hens produce broods, 300 young enter summer. Losses on

roadways and from natural causes cut the mid-summer's 370 birds down to 239 by autumn. Hunting and other mortality factors will skim off another 115 birds, and normal winter losses will further reduce the example population back down to the original 100 adult birds that entered spring.



access—along open roads and highways or near farmsteads. These are not generally the areas of greatest need and can even be detrimental to birds attracted there. For example, many birds drawn to roads by a handout are subsequently killed by passing autos.

A statewide feeding program would be extremely expensive. Studies have shown pheasants normally eat 3½ ounces of foodstuffs daily during the winter. The winter pheasant population has averaged between 2½ and 3 million birds the last few years. It would take more than 328 tons of grain per day to feed these birds. Based on a cost of \$1.50 per bushel for corn, it would run over \$17,500 a day for grain alone. Transportation and labor costs to distribute the grain to needed areas would easily double the cost.

Man is not the only creature who preys on the surplus members of a pheasant population. He is the most efficient predator, but he must face some competition from mammals, birds and reptiles. Predator-control programs are designed to cut down on this competition. Unfortunately, predator-prey relationships are not a simple matter of mathematics where the subtraction of a predator equals the addition of pheasants for the hunter.

Predators are opportunists which prey on a species readily available. A fox or coyote will take a pheasant if it's handy, but opportunity varies with pheasant numbers and habitat quality. Pheasants in Nebraska seldom make up a major portion of any predator's diet. The hunting patterns of predators have developed over centuries and are directed toward staple foods such as mice, ground squirrels and rabbits. Such species are characterized by reproductive rates exceeding those of the pheasant. Consequently, predators tend to pursue these more abundant species. What varmint is going to expend extra effort to concentrate on pheasants when a veritable banquet of rodents can be had?

The law of diminishing returns operates the same for four-legged or flying predators as it does man. When the surplus is whittled down

to the level of the carrying capacity of the land, continued effort results in decreased returns. At that point, a prey species such as the pheasant becomes relatively safe from predation.

By the same token, isolated cases of predation, no matter how dramatic they may be, do not necessarily exert a significant effect on the total population. To the individual pheasant who's killed and eaten, it makes a difference, but to the welfare of the entire population, it does not. That ringneck was part of the surplus and as such he was expendable.

A study in southern Minnesota utilized a saturation system of trapping to remove 15 to 20 predators annually from each square mile of a study area. The rate of nest destruction was reduced by at least half, and the reproductive rate (percent) doubled. However, pheasant numbers continued to decline because of adverse weather and habitat losses. Researchers there noted that predator control did not compensate for habitat losses. In addition, the Minnesota study proved costs to be prohibitive—approximately \$21 per predator removed or \$4.50 for each additional chick hatched. With normal survival rates of about 50 percent, the cost for each additional bird reaching maturity would be about \$9. Since only half of these birds can be expected to be cocks, the costs go to \$18 per bird that "might" be harvested in the fall. However, there can be instances where limited predator control would be practical, such as in areas of marginal habitat.

It's a thorny problem for game managers—to try to preach the doctrine of habitat improvement when this trio of action programs is so much more dramatic. However, no amount of stocking, winter feeding or predator control can substitute for or replace a balanced habitat.

The only surefire method of increasing pheasant populations is to improve living conditions for the birds in their homes or habitats. To do that, the major factor limiting the population must be identified. Secure nesting habitat is the primary problem in most parts of Nebraska.

*Biologists employ many techniques to measure the viability of pheasant populations. Seasonal surveys yield estimates of numbers and periodic examinations check health. Here, a pheasant's age is being determined with the aid of a wing-fan.*



Weather is also an important limiting factor, but one that man has not yet been able to control. However, secure habitat can modify the effects of weather and secondary limiting factors, such as predation.

Given these conditions, what type of management program or programs can be implemented that will affect enough acres of land to materially increase pheasant populations?

Some 97 percent of the land in Nebraska is privately owned, and quite naturally most pheasants are produced and harvested on these

## *Effective management of habitat is the key to the abundance of all wildlife species*

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lands. Any program to significantly increase pheasant numbers on a statewide basis depends on getting cover on these lands. Federal farm programs offer the greatest potential for attaining this goal. The Soil Bank program aptly illustrates the benefits to wildlife possible through farm programs. Large acreages were retired from crop production under long-term contracts, and pheasants responded to the increased cover by nearly doubling their population. When Soil Bank folded, pheasant numbers declined accordingly, adjusting to the new carrying capacity of the land.

The importance of Federal farm programs to pheasants and Nebraska hunters was also demonstrated by C.A.P. or Cropland Adjustment Program. CAP was initiated in 1966 as a 5-or-10-year retirement program that provided an additional incentive payment to landowners who allowed public access on retired acres. When compared to the Soil Bank Program, the amount of quality wildlife habitat created by CAP (111,000 acres) was quite small. However, the importance of this program should not be minimized.

During the fifth year of CAP (1970), the Game and Parks Commission surveyed landowners and hunters to determine: landowner and hunter acceptance of the program, the rate that these lands were utilized by hunters, and the number of pheasants harvested on these lands.

Results of the survey indicated that approximately 58,400 resident hunters harvested 151,840 pheasants on CAP fields during 1970. Based on these figures almost 14 percent of all cock pheasants harvested that year by Nebraska hunters were taken on CAP lands. Hunter

success in terms of birds bagged per day, and birds per hour was also higher than on non-CAP land.

The results of the landowner survey were even more interesting than results of the hunter survey. There was considerable concern in some circles that replacing landowner control with free access could generate some serious problems.

Approximately 52 percent of the landowners surveyed indicated that they had been concerned about hunter behavior prior to enrolling in the program. Of this group, 80 percent indicated that they had experienced fewer problems with hunters than expected, and 89 percent would sign up for the program again. Ninety-one percent of the landowners who were not concerned with hunter behavior indicated that they would enroll again if given the opportunity. Most of the landowners who stated that they would not sign up again indicated that their reason was because they had other uses for the land, and not because of hunter behavior.

CAP was a relatively small-scale land retirement program that was well received by all participants—pheasants, landowners and sportsmen. Landowners received an incentive payment for public access. Sportsmen found increased recreational opportunity on these lands and their behavior was generally good. Pheasants responded to the improved habitat and set up house keeping. A truly beneficial program for all concerned.

“Diverted acres” or “set-aside acres” programs, in effect since 1961, have been the only option available to Nebraska farmers in recent years. Cropland under the set-aside program was retired from production under annual contracts. USDA figures show that close to 4 million acres in Nebraska were retired in 1972, and payments to Nebraska farmers were well over \$100 million.

Nebraska and 12 other states established a special Farm Program Committee in 1972 to document management practices on lands retired under the set-aside program and to work for legislation to improve the

program for farmers and the general public.

The committee is working toward getting cover crops on retired lands to reduce soil erosion. The USDA's Soil Conservation Service pinpoints soil erosion as the dominant problem on 64 percent of the nation's farmland. Wildlife agencies have a vested interest in controlling erosion because wildlife, like any crop, is dependent on fertile soils. These agencies also have the responsibility for fisheries resources, and siltation from erosion is detrimental to streams and lakes. Other objectives of the committee include the enhancement of wildlife, recreational, and aesthetic values of set-aside lands.

A survey of the 4 million acres diverted in Nebraska during 1972 showed approximately 70 percent of the land was bare and subject to erosion. Vegetation classified as poor or fair nesting cover occurred on 15 percent of these acres, while only the remaining 15 percent had good or excellent cover.

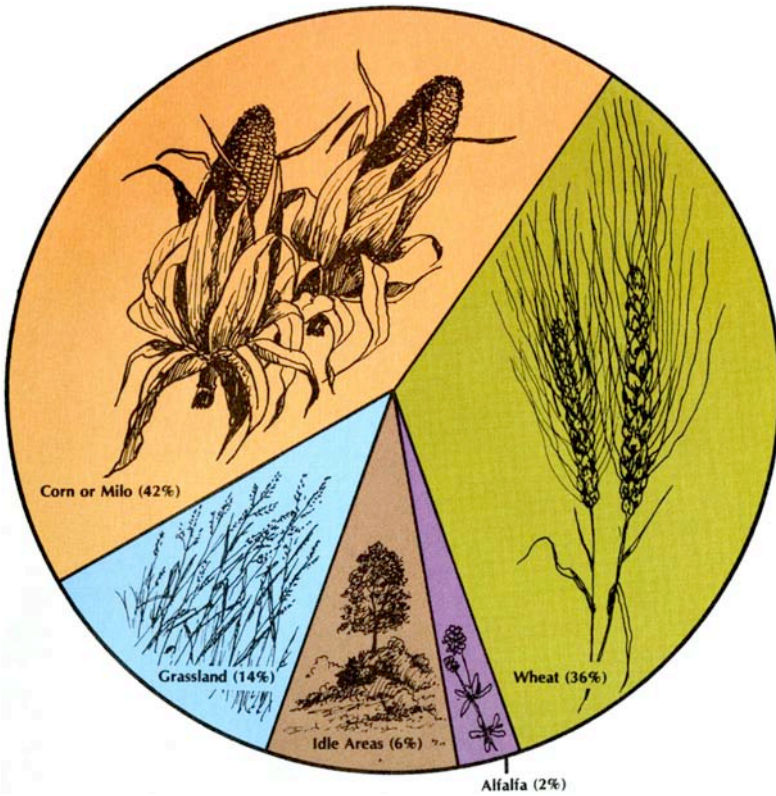
Satisfactory legislation, as far as game managers are concerned, would allow the farmer management flexibility, reduce soil erosion, and enhance wildlife. Such a law would call for long-term contracts, of three to five years, on a partial-farm basis; cost sharing to establish permanent soil-building cover on areas retired for the longer period, and annual cover on short-term retired land.

Roadsides comprise another area long neglected in habitat management, but receiving considerable attention of late. There are thousands of acres of roadsides across Nebraska, and they are extremely important as pheasant nesting cover. Development of a plan to manage these strips of permanent cover can produce pheasants at a cost far below the expenses of artificial means. A good management program can also save the taxpayer money through reduced mowing and weed control operations.

Habitat management is the key to abundance of any wildlife species, including the pheasant, and only through a sound program can wildlife populations thrive. Ω

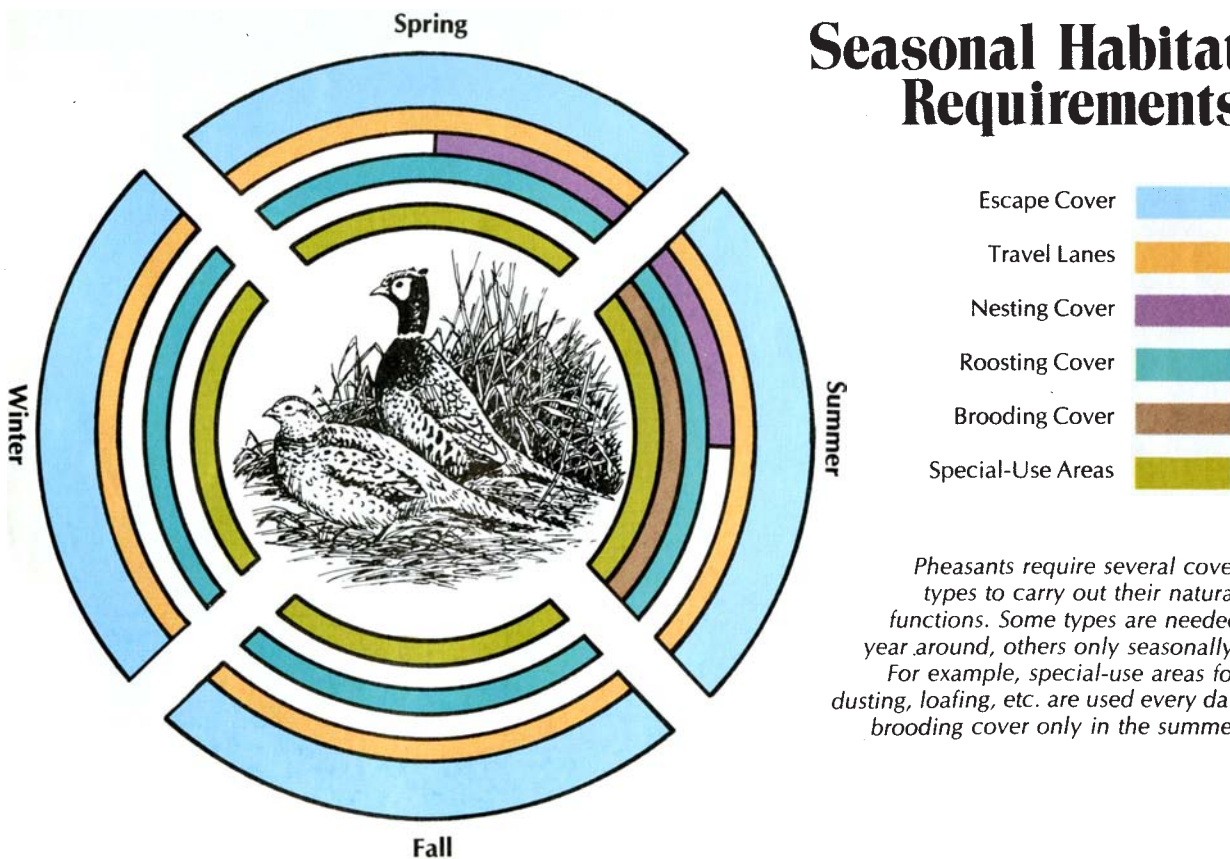


# Optimum Land Use for Pheasant Production



Presented graphically at the left is an ideal ratio of land-use types for optimum pheasant production. Grain crops provide a stable food source; wheat, nesting cover; alfalfa, brooding cover; pastures and grasslands, nesting cover; and idle or waste areas are important sources of nesting, loafing, roosting and winter cover. Ideally, each land cover type occurs in small units and in close proximity to one another.

# Seasonal Habitat Requirements



Pheasants require several cover types to carry out their natural functions. Some types are needed year around, others only seasonally. For example, special-use areas for dusting, loafing, etc. are used every day, brooding cover only in the summer.



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