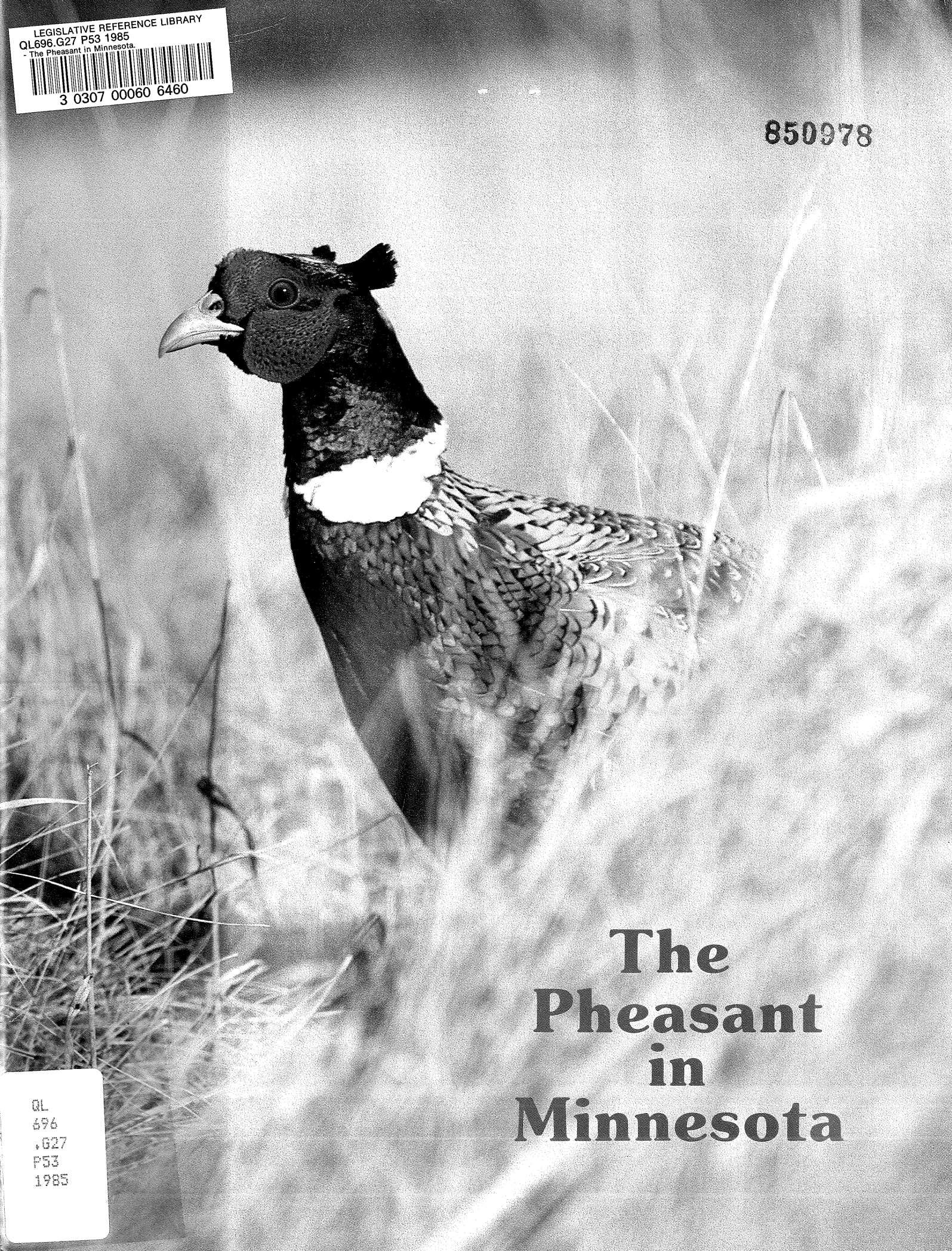

The Pheasant in Minnesota

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1985

**Produced by the Section of Wildlife,
Minnesota Department of Natural Resources.**

Cover Photograph By Greg Gersbach

Credits • Contents

The Pheasant in Minnesota

Text and Layout by Chuck Wechsler

While this booklet reflects the efforts of many biologists and wildlife managers, the following members of the Department of Natural Resources' Farmland Wildlife Committee deserve special mention:

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The Pheasant in Minnesota also features the photographs of Earl Kopischke, former wildlife biologist at Madelia. Over his career, he took hundreds of photos that found extensive use in slide talks, magazine articles, and scientific reports. Mr. Kopischke died on Feb. 16, 1985, two months before this book was published.

Introduction

OVER MUCH OF the past 70 years, the ring-necked pheasant has been our most popular and important upland game bird. At one time, one of every six Minnesotans hunted pheasants. Only two decades ago, some 300,000 hunters harvested one million birds annually. Today, however, these figures have dropped by more than two-thirds.

Clearly, our pheasant-hunting tradition has come to a crossroads. Do we allow the pheasant to follow the path of the prairie chicken—to gradually fade from Minnesota's rural landscape? Or do we invest time and money in a long-term commitment to improve habitat conditions that ensure good pheasant populations?

This book, funded primarily by sportsmen through purchases of Pheasant Habitat Stamps, launches a new effort to revive our ringneck heritage.

Like corn and soybeans, the pheasant is a renewable resource, a product of the land that can be managed to produce annual harvests. And the ringneck is well-suited to modern wildlife management. Few game birds can match its reproductive capability and its durability. The ringneck is also unique because it can withstand tremendous hunting pressure. In fact, as long as hunters take only roosters, we invariably underharvest our pheasant resource.

Minnesota's ringneck population is reeling from a shortage of safe nesting cover and winter roosts near dependable food supplies. The key to restoring pheasant numbers, then, is to provide more habitat for the birds. Accomplishing this goal over the 64-county pheasant range will not only be costly, but the results may not be detectable for perhaps a decade. It is an effort that will require the continuing support of sportsmen, legislators, policy makers, and most important, landowners.

We are already seeing some evidence of change. Discouraged by high fuel costs and continuing fluctuations in farm prices, many farmers no longer subscribe to the notions that "bigger is better" and "live only for today." Many now regard wildlife as an indicator of a farm's health. The more diversified the wildlife, the healthier the land.

The abundance of pheasants and other wildlife in our state also tells us something about ourselves. Do we measure our quality of life by the number of acres we convert to roads, shopping centers, golf courses, and industrial complexes? Can we truly be happy without wildlands and wildlife?

As you read this book, remember the poignant words of naturalist/philosopher Joseph Wood Krutch: "For every creature there is a paradox at the heart of the necessary 'struggle for existence' and the paradox is simply this: Neither man nor any other animal can afford to triumph in that struggle too completely."

Bureau of Information & Education, MDNR

Gary R. Zahm

Introducing the Ringneck

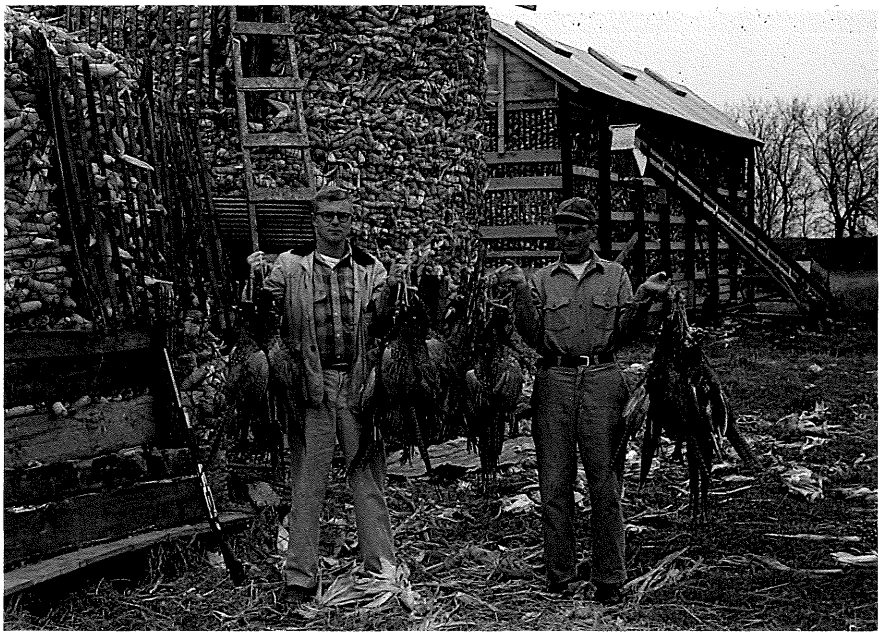
OUR MODERN ring-necked pheasant is the colorful end-product of an evolutionary process that spans eons of time. Although the pheasant's homeland is Asia and Asia Minor, paleontologists have found the fossil remains of a huge, flightless species that lived in southern France and Greece some 25 million years ago. The prehistoric pheasant stood about five feet tall and weighed nearly 300 pounds.

Pheasants eventually died out in Europe, but continued to thrive in Asia, from the Caucasus Region along the Black Sea eastward to Japan. Asia's 34 varieties of true pheasants have been appreciated by Oriental artists and gourmets for centuries. The Chinese, for example, depicted pheasants on paintings and embroidered silk tapestries some 3,000 years ago, providing the earliest known records of the birds.

The first attempts to transplant pheasants were probably made by Greek voyageurs, who brought birds from the Caucasus to Greece about 1300 B.C. It was the conquering Roman empire, however, that spread pheasants across western Europe.

Several varieties of pheasants eventually became established in Europe. Black-necked pheasants reached England in the days of Julius Ceasar, who invaded the country about the middle of the first century B.C. Thirteen centuries later, several kinds of wild pheasants were flourishing in the Rhine Valley of central Europe and by the 1600s, pheasants were being hunted in Denmark. It wasn't until about 1740 that Chinese ringnecked pheasants were stocked in Great Britain. Other introductions included the Japanese and the Kirghiz, or Mongolian, ringneck. These species interbred, resulting in the hybrid ringneck that was later introduced in several regions of North America.

John A. Scharf



The results of a morning's hunt in 1955.

American Immigrant

America's chapter in the pheasant success story began as a series of false starts. The first recorded stocking was in 1733, when a dozen pairs of English black-necked pheasants were released on an island in New York harbor. About 60 years later, the son-in-law of Benjamin Franklin imported an unknown number of pheasants from England and released them along the Delaware River in New Jersey. The governor of New Hampshire also released imported birds. However, none of these attempts were successful. Most of the birds were the black-necked strain, which is not as hardy as other pheasant races.

Nearly a century would pass before the pheasant would gain a permanent foothold in America. In 1880, Judge Owen Nickerson Denny, the U.S. consul to China, purchased 70 live pheasants at a Chinese food market. He shipped the birds to Seattle, Washington, but only eight survived the rough voyage, and they were too weak to be released into the wild.

Undaunted, Judge Denny tried again the following year, shipping 30 Chinese ringnecks in more spacious cages. This time, 26 survived and were soon released on the Denny home place in the Willamette Valley of Oregon.

When Judge Denny returned to Oregon in 1884, the birds were already spreading into adjoining counties. Eight years later, Oregon opened a 75-day season and hunters bagged 50,000 pheasants!

News of Oregon's pheasant bonanza spread like wildfire. Before long, state agencies, sportsmen's clubs, and individuals throughout the country were stocking pheasants in every conceivable habitat, from deserts to mountains. Eventually, pheasants would be released in 40 of the 50 states.

Pheasant Distribution

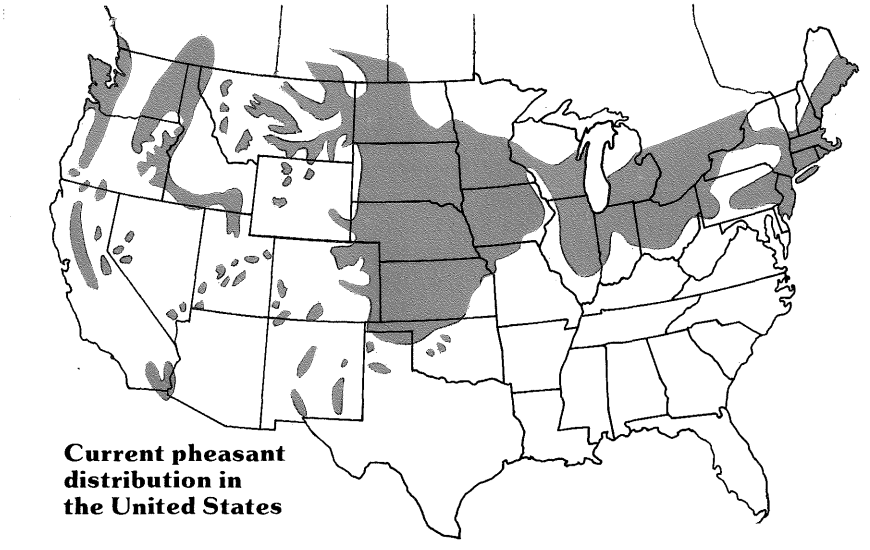
The ringneck's current range extends over much of the northern half of the U.S. and into some regions of southern Canada. Although the pheasant is very adaptable, it does have some specific requirements. Most wildlife biologists believe that climate is the major factor controlling pheasant distribution, but soil type and land use are also important.

Pheasants are not found in the South, primarily because springtime temperatures are too warm for the developing embryos in their eggs. Meanwhile, cool temperatures and excessive snowfall limit the bird's northward spread.

Rainfall, or the lack of it, also affects pheasant distribution. In California and the arid Southwest, pheasants live only in irrigated river valleys. Conversely, they do not exist where there is too much rainfall, such as the coastal rain forests of the Pacific Northwest.

Ringnecks fare best on the same dark, fertile soils that support cash crops. These soils are rich in phosphorus, nitrogen, and other elements that grow corn, soybeans, and small grains. Infertile, sandy or rocky soils, which produce only marginal crop yields, typically have marginal pheasant populations.

Across the pheasant range, the line separating good ringneck country from unsuitable range is surprisingly well-defined. One reason, many believe, can be traced to a lack of calcium in the soils. In 1961, a Minnesota biologist superimposed a map of calcium-bearing soil over the pheasant range. He noticed that ringnecks and calcerous soils were most common in the southwestern part of the state, while both were lacking in southeastern countries. A two-year study in Lancaster County, Pennsylvania, found similar results.



Current pheasant distribution in the United States

The Pheasant in Minnesota

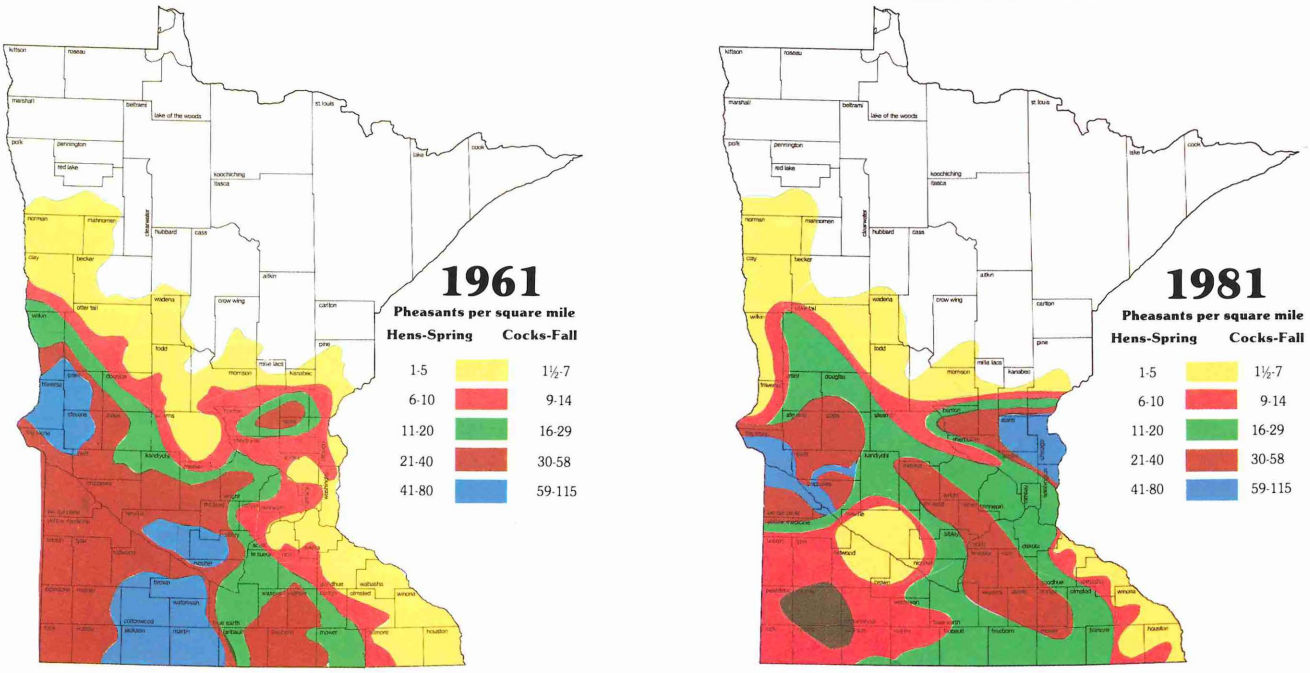
The ringneck first came to Minnesota in 1905, when the Department of Game and Fish acquired 70 pairs from Wisconsin and Illinois. The birds were released, but none survived.

In 1916, the Minnesota Game Protective League, an umbrella organization for state sportsmen's clubs, established a game farm on Big Island in Lake Minnetonka. The Game and Fish Department took over the operation in 1917, when the state legislature appropriated $17,000 for propagating pheasants, bobwhite quail, and ruffed grouse at the game farm.

From 1916 to 1918, Game and Fish released some 4000 pheasants, while providing about 6000 eggs to farmers and sportsmen interested in rearing pheasants. By 1922,

John A. Scharf

Early photo of a pheasant release in Murray County.



Pheasant distribution in Minnesota shifted considerably between 1961 and 1981.

pheasants had been released in 78 of the state's 87 counties, from Lake of the Woods to Houston.

In a 1922 Biennial Report, the superintendent of game propagation wrote: "In face of all obstacles against the increase of pheasants, the work done by the state can be considered successful. From no pheasants to speak of six years ago, there are now many birds in the state. Reports from districts where both birds and eggs have been distributed show that the pheasants have been doing fine."

Amid such glowing reports, Minnesota held its first hunt in 1924. But unlike Oregon's phenomenal first season, only 300 roosters were taken during a four-day hunt in Hennepin and Carver counties. Just seven years later, however, 49 counties were opened and over one million roosters were harvested during a 10-day season.

The state's record harvest came in 1941, when an estimated 1,790,000 pheasants were bagged in just 17 days. But there's an asterisk next to that figure, because hunters were allowed one hen in their daily bag of three birds. The largest roosters-only kill was in 1958 when 1,562,000 were taken.

Rise and Fall of the Ringneck

From 1940 to 1960, Minnesota's fall pheasant numbers ranged from a record six million birds in 1958 to one million in 1947. Recent populations have varied from two million in 1981 to only 500,000 in 1984.

Why has Minnesota's pheasant population experienced such a largescale decline? The answer is simple: changing agricultural and land use practices.

When pheasants were first introduced in Minnesota, the agricultural region was sprinkled with many small farms, each providing a diversity of crops and wild habitat. The birds found lush nesting cover in late-mowed hayfields, and field margins such as wide fencelines and shelterbelts. They took advantage of good winter cover along small lakes, wetlands, and narrow, meandering streams that laced the countryside.

The state's pheasant population began its alarming decline in the early 1940s with the start of World War II and the agricultural revolution. Farming practices intensified, primarily to support the war effort and worldwide food needs. Idle patches enrolled in government programs or left because of poor economic conditions were planted to continuous rotations of row crops. Landowners began using artificial fertilizers to enrich the soil and pesticides to control insects and weeds. Countless woodlots and shelterbelts were razed and mile after mile of fencelines were removed. Over nine million acres of marshes and small lakes, or nine-tenths of the farm country wetlands, would ultimately be destroyed, primarily to make room for additional cropland.

Over the past four decades, the mix of crops has also changed—and not to the pheasant's liking. Since 1940, the amount of land devoted to row crops has increased three-fold (from 4.2 million acres to 13 million), while acreage in small grains, which once provided safe late-nesting cover for pheasants, has declined by over one-half (from 7.8 million acres to 3.2 million).

Pheasant numbers have likewise suffered from changing trends in hay and alfalfa production. In 1940,

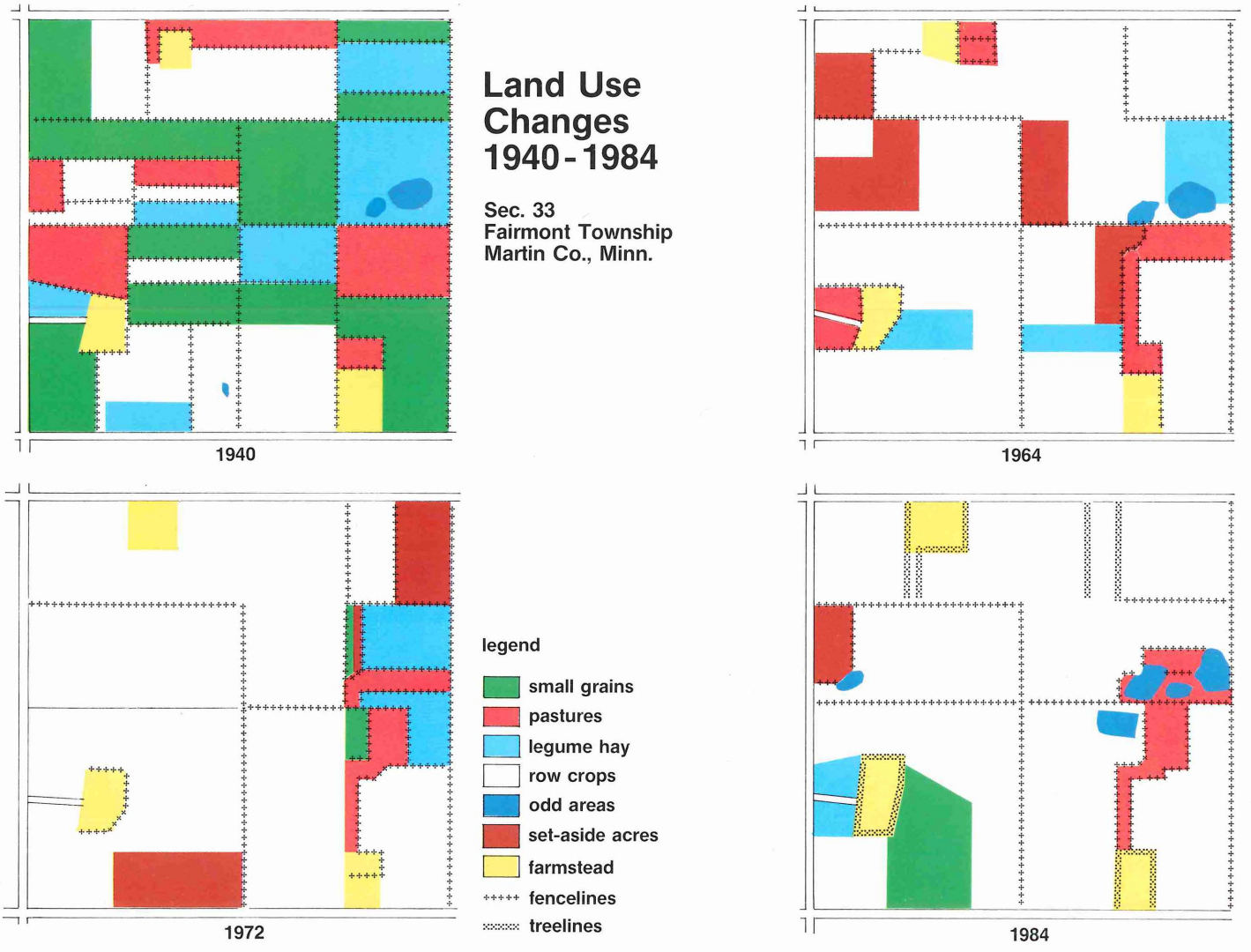
Minnesota had 3.4 million acres in wild and late-mowed tame hay, like red clover and timothy. Seldom mowed before mid-June, these haylands were vital pheasant factories. But in the late 1950s, agricultural researchers discovered that alfalfa produced better quality hay, especially if cut earlier. First cuttings now come in late May or early June, resulting in a tremendous loss of hens and chicks to high-speed swathers.

In 1940, alfalfa hayfields were nonexistent in pheasant country; in 1980, there were 1.7 million acres, drawing many hens away from safe nesting places into fields where they have little chance of bringing off their broods. Meanwhile, pheasants found only one-fifth as many acres of tame hay in 1980.

Yet another factor in the pheasant's decline has been the loss of nesting habitat on lands set aside by government land-retirement programs. In 1940, 3.1 million acres were retired and seeded to grasses and legumes, providing excellent, undisturbed nesting cover for pheasants. In 1980, there were none.

The importance of quality nesting habitat to pheasant production became most obvious from 1958 to 1964. During that period, American farmers enrolled from one to two million acres per year in a land retirement program, popularly known as Soil Bank. Under long-term contracts, farmers were required to plant legumes and grasses, and refrain from mowing or grazing their Soil Bank lands. During the peak years of the program, Minnesota and many other states boasted record pheasant populations. But when Soil Bank was curtailed, pheasant numbers immediately declined due to the widespread loss of habitat.

The lesson we learned from the heydays of Soil Bank was simple: With good habitat, pheasant numbers will remain good, despite severe weather, predation, hunting, disease, and food shortages.



This chart, drawn from high-altitude photographs, documents the alarming decline of wildlife habitat in one section in Martin County from 1940 to 1984.

Facts About Pheasants

PHEASANTS BELONG to the scientific order of birds called Galliformes, a group of gallinaceous, or chicken-like, birds. They are members of the family Phasianidae, a name that originated with the ancient Greeks, who referred to the bird as *Phasianus ornis*, or bird of Phasis. The Phasis River (now Rioni) flows through the Colchis Region of the Caucasus Mountains in western Asia.

Modern taxonomists separate true pheasants into two species: *Phasianus colchicus* with 31 subspecies, and *Phasianus versicolor* with three subspecies. Pheasants can be further grouped into six common subdivisions: gray-rumped, or Chinese pheasants; Kirghiz, or Mongolian; olive-rumped, or Tarim; black-necked, or Colchis; white-winged; and green, or Japanese.

Pheasant subspecies freely interbreed. For this reason, our modern Minnesota pheasant embodies a varied ancestry which probably includes the black-neck, Mongolian, Japanese, and Chinese. However, today's pheasants closely resemble the Chinese ringneck, or *P. colchicus torquatus*, in appearance and behavior.

The Colorful Ringneck

The cock ringneck is a striking bird. His scarlet eye patches, or wattles, are surrounded by iridescent violets and greens. Beneath the distinctive white neck-ring, the russet feathers have a scaled look, each outlined in black. The remainder of the rooster's body is a collage of russets, tans, greens, white, and black. Most roosters have a powder blue to gray rump patch, or *saddle*, that ends at the base of the tail. The magnificent tail, which may exceed two feet in length, is marked with black or brown crossbars.

Hen pheasants weigh about 2 to 2½ pounds and measure about 20 inches from beak to tail. Roosters weigh about one-half pound more and may reach 36 inches in length.

The hen has a shorter tail and is drab by comparison. But her buff and tan plumage, accented by black and brown markings, provides near-perfect camouflage while nesting, helping her to escape the probing eyes of predators.

Although most roosters are similar in appearance, hunters sometimes take birds that vary widely in marking and color. Some roosters lack white neck-rings; others appear almost coal-black except for beaks, legs, and wattles.

Rugged and Resourceful

The ringneck is well-attuned to its environment. Its stealthy nature is reinforced by senses of sight and hearing that rival those of the wild turkey. A wily rooster can spot a hunter from several hundred yards away. And he wastes little time making his get-away, either slinking off through cover or racing ahead until he feels safe.

Ears of the pheasant consist of a small hole behind each eye. Although its hearing apparatus does not seem as sophisticated as ours, the pheasant's sense of hearing is considerably better. The soft metallic click of a shotgun action or the murmur of distant voices will put the birds on instant alert. This explains why veteran hunters try to make no more noise than necessary.

Ringnecks can apparently detect sounds or ground vibrations from long distances away. During World War I, captive pheasants showed a definite response to canon fire some 300 miles away. Yet the explosions were inaudible to humans. The birds either picked up the sound waves through their ears or detected the explosions through

Ron Spomer

subtle ground vibrations.

Anyone who has cleaned or eaten pheasants has probably noticed several other interesting characteristics of the birds. For example, thick layers of yellow fat help pheasants withstand the intense cold of a Minnesota winter. As winter progresses, the pheasant gradually burns up its fat stores, which releases energy in the form of heat. The pheasant's yellow fat offers more caloric energy per ounce than does the white fat in grouse or quail.

Pheasants have breast meat that is lighter in color than that of wild ducks and geese. The red muscles of waterfowl function through aerobic metabolism, which means they burn up oxygen. Ducks and geese can fly hundreds of miles non-stop, because an extensive network of blood vessels continually fuels the breast muscles with oxygen. The white muscles of pheasants function through anerobic metabolism—instead of oxygen, they use up glycogen. A flying pheasant quickly burns its supply of glycogen. Once its power source is diminished, it must rest long enough for the muscles to replenish their supply of fuel. This explains why pheasants have difficulty flying much farther than a mile or two. Most birds fly only about one-half mile after flushing.

But what a pheasant lacks in distance, it makes up for in sheer speed. A rooster can spring into the air and by flapping its wings rapidly, gain a flight speed of 35 to 45 miles per hour in seconds. The pheasant's short, rounded wings provide a low ratio of wing area to body weight, so it must compensate by beating its wings about three times per second during level flight. Ducks by comparison average only two wingbeats per second.

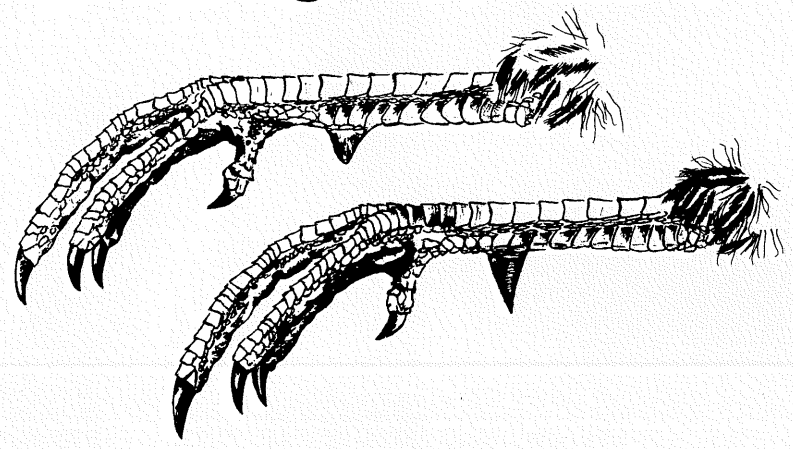
A flushed rooster will normally land with its legs in high gear. Its long legs are built for sprinting with splinter-like sesamoid bones that provide added strength to the muscles. On flat ground, a racing ringneck can hit speeds of 8 to 10 miles per hour, fast enough to outrun most hunters. Even more surprising is how a wounded rooster can hotfoot across a plowed field or other broken terrain, seemingly without missing a step or losing speed.

A constant source of amazement (and frustration) to hunters is the rooster's uncanny ability to hide once it has been downed. One would expect little difficulty finding a three-pound rooster, with its long tail and colorful plumage. But a wounded bird will squirm into thick cover, where its mottled plumage makes it almost impossible to find without a dog. Wounded birds, and even healthy ones, may slip into woodchuck holes or swim across small streams and ponds. Their plumage is buoyant enough to support them for a short time.

The rooster's durability is also obvious to the hunter who catches a bird with a full pattern of No. 6s, only to watch it continue flying. Occasionally, a fatally-hit bird will set its wings and glide several hundred yards. Often, it will be out

How to Age Fall Pheasants

Rick Erpelding



Roosters can be roughly aged by looking at their spurs. By fall, the spurs on a young bird are dull-covered, blunt, and usually between 1/4 and 3/8 inch long. By contrast, spurs on an adult rooster are glossy black, sharp, and longer than 1/2 inch.

Another method of distinguishing young-of-the-year roosters from older birds is to hold the pheasant by its lower bill. On an older bird, the bill will support the bird's weight without bending. On a young rooster, the bill will usually bend or may even break.

Ron Spomer

Pheasants and other birds have an extra "eyelid." Called the nictitating membrane, it cleans and moistens the eyeball, and may serve as a windscreen during flight.

of sight to the hunters, when it suddenly folds and drops like a stone. Experienced sportsmen always watch a bird carefully for any sign of a hit. If they see the bird is hit, they mark the spot where it sails down, then scour the area thoroughly. In these instances, a good hunting dog is invaluable.

Pheasant Foods

The ringneck's ability to adapt to so many different environments is reflected in its diverse list of foods. Although they prefer corn and other agricultural grains, pheasants will dine on more than 500 different items. They have even been known to eat snakes, mice, and dead animals, or *carrion.*

Like all gallinaceous birds, the pheasant stores food in its crop, a pouchlike organ at the base of the neck. From the crop, the food drops down into the gizzard where it is ground until small enough to be digested. This type of digestive system enhances the pheasant's ability to survive. A bird can gather a lot of food in short order, then retire to the safety of cover to digest its food.

Pheasants swallow small stones, gravel, and other grit which goes into the gizzard to help grind their food. Grit also provides a source of calcium, magnesium, and other minerals. Pheasants may gather a variety of other hard objects for their gizzards, such as pieces of glass or bone. One biologist discovered several shingle nails that had been worn down to the size of upholestry tacks.

Disease Free

When it comes to good health, the pheasant leads a charmed life. Wild pheasants are seldom affected by disease and parasites. Some birds are hosts for various kinds of mites and lice. Tapeworms, cecal worms, and gapeworms have also been found, but only in an occasional bird.

Despite all its toughness and disease resistance, only one out of every six pheasant chicks will live one year and less than one in 20 will survive until age two. Pheasants may live as long as six years in the wild, but the average life-span is about seven months.

Chuck Wechsler

Snow-white pheasants and those with grayish-white mottling are unusual color phases that result from a lack of pigmentation, though in some cases, they result from mutations. Albino pheasants, complete with the characteristic pink eyes, are very rare.

The Nesting Season

Earl Kopischke

THE STRIDENT crowing of rooster pheasants is a certain sign that nature's clock has turned to spring. Crowing activity begins in early March and usually peaks by early May. During this period, the pheasant population is at an ebb, drawn down by a full year of mortality from weather, accidents, and hunting. The percentage of roosters is also low—about one cock for every three or four hens.

Crowing is the rooster's way of proclaiming his territory and attracting hens. The more aggressive cocks stake claims to territories, which range from 3 to 10 acres, and generally include a mix of grassy and woody cover. The remaining roosters compete for marginal habitat.

The boundaries of a rooster's territory are not well defined and often change, depending on the movement of his hens, pressure from competing cocks, or the disappearance of a neighboring rooster. Still, boundary disputes are common. The larger, more dominant cock will usually bluff down his adversary, but occasionally, roosters will engage in fierce battles, using their long spurs and sharp beaks as weapons. Some fights may end in death.

Roosters are not choosy about their mates, actively courting any hens that stroll into their territories. The typical rooster accumulates and breeds a harem of 3 to 7 hens; some have 15 or more. But not all have harems. Bachelor birds roam from one territory to another, picking fights, and trying to establish their own harems.

Courtship Rites

Pheasant courtship is a fascinating springtime spectacle. For his role, the rooster cuts a dashing figure. Hormonal changes in his system, stimulated by the lengthening days of spring, have swollen his crimson eye patches

and turned his eyes from dull gold to burning amber.

The courtship act is a one-sided affair. The rooster extends one wing downward and tilts his fanned tailfeathers toward the hen. He holds his head low, flares his neck feathers, and erects his inch-long ear tufts. While maintaining this awkward position, he bobs and prances, turning quickly, and occasionally capering around the hen in short, quick steps. He may even offer the hen a choice morsel, like a kernel of corn. Despite the rooster's colorful costume and wild gyrations, the hen may continue to feed or walk nonchalantly around her suitor. Or she may leave him to find another rooster.

Courting roosters must meet certain dress codes. Tail-less roosters or those with broken tailfeathers have trouble competing in the dating game. In one study, over half of the full-tailed roosters had harems. But among 41 tail-less cocks observed, only 3 were accompanied by hens.

If interested, the hen will crouch at the rooster's side and allow mating to take place. One mating will produce fertile eggs for an average period of 22 days, although some hens may continue laying fertile eggs for up to 42 days.

Nesting Behavior

Hens do not always lay eggs in their own nests. Early in the nesting season, the hen may randomly drop her olive-brown, unspotted eggs, making no attempt to conceal them. This reckless behavior is most common during cold springs, when cover has not grown tall enough to interest hens in establishing a nest. Later, she may deposit eggs in a dump nest containing eggs from several hens. The usual dump nest has 20 to 30 eggs, but some have as many as 50.

Pheasant hens also lay their eggs in the nests of waterfowl, like blue-winged teal and mallards. In one study in southwestern Minnesota, over one-fourth of the Hungarian partridge nests contained at least one pheasant egg. Called *nest parasitism,* this behavior is most common where hen densities are high in relation to available nesting cover.

The loss of so many eggs in dump nests and in the nests of other birds would seem to have a detrimental effect on the overall pheasant hatch. But only 60 percent of these abandoned eggs are fertile, compared to a 90 to 95 percent fertility rate among eggs in established pheasant nests.

The number of eggs that a hen produces is determined by her health and the amount of calcium she has accumulated during spring. Hens seek out grit that is high in calcium. By picking up gravel, crushed limestone, snail shells, and other calcium-bearing materials, they are capable of producing more eggs. A Pennsylvania study revealed that hens fed a heavy diet of limestone grit produced about 10 times as many eggs than hens on a similar diet, but with granite as the source of grit.

Although hens begin dropping eggs in early April, most do not get down to housekeeping chores until late April or early May. Pheasant hens usually nest in shallow depressions 4 to 7 inches wide and 1 to 3 inches deep. The hen may claw out the depression or use a natural hollow. Most nests are loosely lined with dried grasses, leaves, small twigs, or corn husks. The hen adds feathers and additional vegetation as egg-laying and incubating progress.

Not all birds nest on the ground. A few may nest atop marsh tussocks or haystacks. One batch of eggs was found in an abandoned crow's nest 20 feet off the ground.

Gary R. Zahm

When crowing, the rooster clasps vegetation or any immovable object with his feet, stretches his neck and body, and calls in a loud, raspy voice. Immediately after crowing, he beats his wings rapidly for several seconds, as if to clear the air. Most crowing occurs one-half hour before sunrise or just before sunset, though cocks may crow at any time of the day.

Nest Sites

Throughout the nesting season, many hens are drawn to residual grassy cover in roadsides, drainage ditches, railroad rights-of-way, shelterbelts and woodlots, and the edges of marshes and small lakes.

Roadsides are a boon to pheasant production in Minnesota. They comprise only two percent of the total land area in the pheasant range, yet they can produce 25 to 50 percent of the chicks, particularly where nesting cover is lacking in other habitats. Roadsides with thick stands of early-maturing grasses, like smooth brome blended with alfalfa and a light growth of annual forbs, offer good cover early in the nesting season. Biologists have found up to three nests per acre in these roadsides. Most hens nest in the ditch bottom followed by the back slope (next to the fenceline). The fewest number are found on the road shoulder.

The hen nesting in a roadside has a 20 to 30 percent chance of hatching her eggs. Many nests are lost to mowing and other farming operations, or to predators.

Fox, raccoon, skunks, and even freelancing domestic cats can have a significant impact on chick production in roadsides and other narrow strips of cover. The narrower the strip, the greater the impact of predators. Over a 10-year study of weedy fencerows in Nebraska, biologists found many nests, but few chicks were produced. Railroad rights-of-way are excellent nest sites, because they are generally wider than fencelines and roadsides, and less likely to be disturbed by mowing.

Although row crops make poor nesting cover, fields of small grain like wheat, oats, and barley often produce more chicks than any other cover type. The reason is that they provide secure cover for renesting birds.

Only 16 percent of the hens nest in small grains, but of these, about 50 percent will be successful. Hens and eggs are relatively safe from farming operations, because the grain is normally harvested after the hens bring off their broods. Some hens survive harvest operations if they remain hunkered down over their eggs, well below the swathing blade. In addition, predators encounter more difficulty finding a few nests scattered over a large field of grain.

The hen nesting in an alfalfa field, however, is playing a form of Russian roulette, not only with her life, but also the lives of her chicks. Up to one-third of all Minnesota hens nest in alfalfa and other types of hayfields, yet about 95 percent of their nests are lost, primarily to mowing operations. In Minnesota, most first cuttings of alfalfa are around the first week of June, which typically is just prior to the peak of the pheasant hatch (June 7-15). Modern, high-speed mowers take a deadly toll. In fact, the loss of hens, eggs, and chicks to farm machinery may exceed the number of roosters harvested during fall.

David Montag

Hens will not initiate their nests in new growth until the vegetation is at least six to eight inches high. The earliest nesters (prior to May 1) establish their nests in residual cover—vegetation left over from the previous year. Canary grass, sedges, and other herbaceous plants on dry sites are particularly attractive to early nests.

Incubation

Once she gets serious about raising a family, the hen will lay about one egg per day. Her eventual clutch may contain as many as 18 eggs, although the average is 12. She does not begin incubating until the clutch is complete.

Just prior to incubation, the hen loses feathers from the center portion of her breast, exposing her brood patch. This area is laced with blood vessels that carry enough warmth to keep the eggs at the right temperature for hatching.

The incubation period lasts about 23 days. The diligent hen remains on her nest, leaving briefly only once or twice each day to feed. Throughout the incubating period, she turns each egg, so the embryo does not stick to the side of the shell and so gases can escape through the membrane. She also adjusts the eggs beneath her body, so they receive equal warmth, insuring that the entire clutch will hatch about the same time.

Egg Losses

In addition to mowing and predation, weather also destroys many eggs. Temperatures of 28°F or colder will chill or freeze the eggs, reducing hatchability. Extremely hot weather, such as air temperatures 94°F or higher, will raise the nest temperature to 112° or more, causing the embryos to begin developing. The eggs are even more vulnerable to temperature fluctuations once the hen begins incubating. After two days of incubation, an embryo will live for 48 hours at 45°F. But after 22 days, it can withstand only 8 hours of 45-degree temperature.

Severe storms can flood out nests or literally beat pheasants to death. In May, 1945, a hailstorm ravaged 1,000 square miles of the pheasant range. About three-fourths of the adult birds in a 130-square mile area were killed. Some 10,000 pheasants died in the Albert Lea area. A similar storm in 1982 killed thousands of birds and eggs over a 50-mile wide swath from Mankato to Albert Lea.

Some eggs are destroyed by spraying operations, although the extent of this loss is difficult to document. Herbicides with a petroleum-based carrier may stick to the egg, reducing air transfer through the shell membrane and killing the embryo.

Nest abandonment also accounts for lost eggs. About one in every ten nests is abandoned. Hens will desert their eggs if another hen nests too close or if they see chicks from another nest. In a Nebraska experiment, incubating hens kept in an enclosure deserted their eggs soon after chicks were placed inside the pen. About one in every three hens will abandon her eggs if flushed off the nest, although this rate depends on the stage of incubation. A hen that has been incubating one week or longer is more apt to return than a hen that has just started to brood. One researcher flushed a hen off her nest on three occasions; each time she returned and eventually hatched her young.

Ken Varland

Ron Spomer

Mowing operations destroy countless nests in alfalfa fields and roadsides. Raccoons and fox also take their share of pheasant eggs and chicks.

Persistent Nesters

Pheasants bring off only one brood a year, but are amazingly determined to be successful. If her nest is destroyed, or even if she abandons the eggs, the hen may continue renesting until she hatches her eggs, loses her clutch late in incubation, or can no longer produce eggs. However, with each successive attempt, the size of her clutch decreases.

Hens will make from one to four attempts at nesting. Because of this strong tendency to renest, from 40 to 70 percent of the hens successfully hatch their eggs.

Most hens renest near the first site, usually laying their first egg about six days after the previous nest failed. Fields of small grain, which in late spring provide relatively tall cover, attract renesting hens.

Pheasant chicks may begin hatching by mid-May during an early, warm spring that follows a mild winter. During years with normal spring and summer weather, about 90 percent of the hatch is complete by August 1. However, some hens will not bring off their broods until early September. This explains why hunters occasionally bag roosters that are just beginning to gain their colorful plumage.

The Brooding Season

IN A NEST at the bottom of a grassy roadside, the first pheasant chicks are starting to pip from their shells. Within 24 hours, downy chicks emerge from 11 of the 12 eggs, getting their first look at the green world around them. Each chick weighs less than an ounce, but is strong enough to walk and feed within several hours after hatching.

The hen leads her chicks away from the nest as soon as their fine down is dry. Most pheasant hens take their broods to fields of small grain, alfalfa, or hay where the chicks can move about easily and feed on insects.

Insects are an excellent source of protein and other nutrients that enable the chicks to grow rapidly. Leafhoppers, flies, crickets, grasshoppers, caterpillars (non-fuzzy types), and other insects comprise about 90 percent of the chick's menu during its first week and over 50 percent during the first five weeks.

As they grow, the chicks undergo an almost continuous molt. At three weeks, their wing feathers are long enough for them to make short flights, sometimes up to 150 feet. By six weeks, their fine down is replaced by drab juvenile plumage which, in turn, gives way to their adult or post-juvenile molt beginning at nine weeks. By this time, the young cocks can be distinguished from hens by patches of color on their breasts, tiny spurs, and by their slightly larger size. At eight weeks, the birds are adept fliers and at 21 weeks, their plumage is virtually identical to that of adults.

The young birds put on weight quickly. Males and females weigh about one-half pound at five weeks. By 14 weeks, roosters total about two pounds and hens one-half pound less. Beyond this age, their growth rate gradually tapers off until they attain their adult weights.

Ken Varland

This July roadside provides lush cover for hens and chicks.

Brood Behavior

During the first three weeks, the hen and her chicks will remain within a 10- to 20-acre area around the nest. They gradually expand their home range to about 70 acres by the time the chicks are seven to eight weeks old. Most broods prefer cover that is dense enough to protect them from predators, but not so thick that the chicks have trouble staying with the hen.

The birds feed in relatively short, open cover during mid-morning, then spend the midday period in loafing areas where they preen and dust. Alfalfa fields are prime feeding and roosting sites. In addition, many broods feed and roost in roadsides and in shallow, grassy drainage ditches. Loafing sites are normally in taller cover, like cornfields and grassy wetland margins. The broods may slip into the shade of woody cover on hot days, usually beneath small trees and shrubs rather than large trees. Toward evening, they move off to roosting areas.

Chuck Wechsler

At 14 weeks of age, this rooster is showing signs of his adult plumage.

Ken Varland

Youngsters with the Youth Conservation Corps search for pheasant nests as part of a DNR research project.

Chuck Wechsler

Cocks become very secretive during the molting period, remaining in heavy cover much of the day.

The attentive hen broods her chicks during the first four weeks. She also leads them to food, attracting her offspring with a special call. Hens and chicks alert each other to danger with mutual alarm calls. A loud distress call from a chick alerts the hen to potential danger. The hen's soft, purring call, meanwhile, will cause her young to freeze.

Chick Mortality

Despite the hen's constant attention, half of her brood will be lost by September. The exact causes of chick mortality are difficult to pin down, because it is next to impossible to find the dead chicks. Mowing, predation, and severe weather probably take the heaviest toll. Young chicks are particularly vulnerable to periods of cold, wet weather. A newly-hatched pheasant will die within three hours if exposed to 45°F temperatures. If separated from the hen during a cold rain, the entire brood may perish. A few, very young chicks, while trying to cross muddy areas, may collect so much mud on their feet that they are unable to walk.

Some chicks die from being sprayed by pesticides; others may perish after eating insects or vegetation that has been chemically treated. But these direct forms of mortality are not as important as the indirect consequences of spraying. Many times a pesticide will eliminate the insect population within the brood's home range. With the insects gone, the hen may lead her brood into marginal habitat, where the chicks have less chance of surviving.

Unfortunately, once a hen loses her brood, she will not renest. Her reproductive system is controlled by a delicate balance of hormones. This balance makes her physiologically and behaviorally prepared to brood, a condition that will not re-emerge until increasing daylight triggers the response the following spring.

The hen remains with her brood for eight to ten weeks, about the time the chicks are half-grown. As summer advances, the family association becomes looser. In Minnesota, a biologist attached radio transmitters to 12-week-old pheasants and tracked their movements. He discovered that juvenile birds may drift as far as one-fourth mile from their broods, but usually return within 24 hours.

Pheasant broods often mingle; sometimes chicks and juveniles gather in groups of 30 or more birds. Determining the extent of mingling among same-age birds is virtually impossible. Biologists have observed, however, that about one of every ten broods contains a mix of different age groups. Also, the higher the population, the greater the tendency to mingle.

Much of the brood mingling results from orphaned chicks attaching themselves to another hen and her brood. Orphans six weeks old or younger may find it difficult to survive, unless adopted by another hen.

A surprising number of hens die each summer. In some years, the die-off may exceed normal winter loses. Many hens have laid more than one clutch of eggs, gradually sapping them of strength. After the rigors of egg-laying and incubating,

most hens drop to their lowest weight of the year. Just after leaving her brood, she undergoes additional stress during her post-nuptial molt. If not strong, she may die from stress or be so weak that she becomes easy prey for a predator.

Adult roosters, on the other hand, are in prime condition during summer. They also undergo a post-nuptial molt, but it occurs several weeks before the hens molt.

Summer Activities

Throughout the remainder of summer, the roosters are often seen accompanying the hens and broods. The adult birds feed predominantly on corn, soybeans, wheat, oats, and sweet clover, and various types of weed seeds like ragweed, foxtail, smartweed, and sunflower. Juvenile birds eat fewer and fewer insects as they grow, and by fall, feed on the same food items as adults.

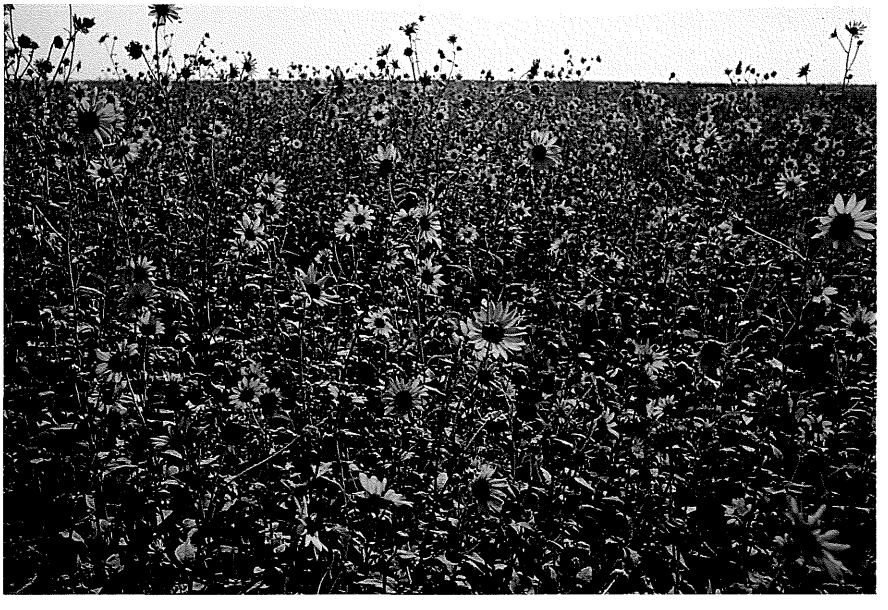
Pheasants get most of their water from dew and from succulent fruits, green plants, and insects. They also drink rain that collects on vegetation. Pheasants will drink from puddles, but standing water is not important to their welfare.

Dust-bathing is part of the ringneck's daily summer regimen. A bird will lie on first one side and then the other, rubbing its wings and body in the soil, and kicking dust up through the feathers. Pheasants bathe in dust for the same reason we jump into a pool on a hot summer day. The dust particles conduct heat away from a bird's body, providing a cooling effect. The fine particles also suffocate lice and mites. The birds dust in loose soils between corn rows, along dirt roads, and even in mounds of powdery soil at the entrance to animal burrows.

By September, nearly all of the broods have broken up, the young cocks leaving first. The juvenile birds gather in small groups or loosely-organized flocks that continually shift from one type of cover to another. By now, the young pheasants are virtually identical to the adults and are developing the same wary nature needed to survive in the months to come. Their summer of living dangerously has honed their survival skills. Each close call and subsequent escape has added to the young birds' bag of tricks so that by fall, they will once again provide a sporting challenge for Minnesota hunters.

Weed seeds like those of sunflower (bottom) play an important role in the pheasant's diet. The birds also feed in lush stands of millet, sudan grass (below) and other herbaceous grasses.

Both Photos by Gary R. Zahm



Autumn's Harvest

BY LATE SEPTEMBER, the magic hand of Autumn has begun to weave the marsh grasses, shrubs, and ripening crops into a brilliant tapestry of emerald greens, ruby reds, and burnished golds. Amidst this splendor, a colorful ringneck rooster glides stealthily through a curtain of grasses at the edge of a marsh. Behind the rooster is a trio of hens, two of them young-of-the-year females that have linked up with the adult birds.

The dawn air is chilly and the grass wet with dew. The birds quickly slip to the edge of cover where they can dry off and soak up the warm sunshine. Within the next half-hour, the small group follows a grassy waterway connecting the marsh with a nearby field of unpicked corn. They spend the remainder of the day in the cornfield, feeding early in the morning and late in the afternoon, but loafing and occasionally dusting during midday.

The daily movements of other flocks are basically the same. Throughout September and October, they roost in grain stubble, hayfields, roadsides, and railroad rights-of-way, but spend daylight hours in fields of corn or soybeans. The rowcrops provide excellent cover and the rows offer easy avenues for finding food.

Pheasant feed heavily in fall, gradually building up fat deposits that will supply the energy needed to survive Minnesota's harsh winters. From September through November, corn will comprise over half of their diet, soybeans and oats about one-third. The remainder is weed seeds and wild fruits. Commonly eaten weed seeds include foxtail, ragweed, wild sunflower, and smartweed.

Hunting and the Ringneck

The annual hunting season, which usually begins in late October, is a time of anticipation, tradition, and companionship for thousands of Minnesotans. It is a time for the farmer to invite family and friends to a memorable opening day in pursuit of ringnecks. And it is a time for father and son, together with their hard-working retriever, to spend many enjoyable and exciting hours afield.

A gaudy rooster exploding from cover can be one of the most exhilarating moments in the outdoors. But waiting to flush at your feet is only one of his tricks. Some roosters will take the opposite tact, leaping into the cold Autumn air well beyond gun-range, then cackling their displeasure as they

Greg Gersbach

sail off to a distant patch of willows. Others will race ahead, then slip into a narrow fenceline or follow some other cover strip to safety. Pheasants will even burrow into soft snow to escape detection.

The pheasant has a reputation for being an easy target, yet on the average, hunters fire about three shots for every bird in the bag. A common tactic of the pheasant is flushing into the wind to gain altitude quickly, then swerving to sail with the breeze. A strong tailwind can push a ringneck to speeds in excess of 50 miles-per-hour. Many a hunter has been amazed by a rooster that flushes at one edge of an advancing line of hunters, then sails across the entire gauntlet, miraculously avoiding a dozen shots.

But not all pheasants escape. By season's end, about 65 percent of the roosters will fall to the gun. Of these, about half are taken over the first three days of the season.

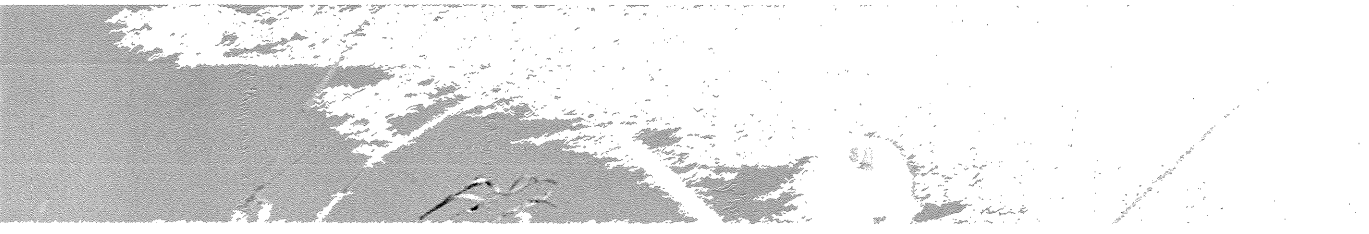
During the hunting season, sportsmen scatter many birds into new habitats. Young cocks, if forced out of their home areas, quite often take up residence elsewhere. However, old roosters usually return to their home ranges after being flushed.

Shortly after the fields of corn and soybeans have been harvested, pheasants find an inexhaustible supply of waste grain. In Minnesota, an estimated 50 million bushels remain in the fields after harvest. Unfortunately, most fields are plowed before freeze-up, leaving only slim pickings for pheasants and other overwintering birds and wildlife.

After harvest, pheasants continue their early morning and late afternoon feeding habitats, but begin to spend more of their loafing time in thicker cover, such as patches of weeds and willow stands. Roosting sites include dense, grassy areas such as wetland margins, roadsides, drainage ditches, and unmowed hayfields.

As winter approaches, the birds are usually segregated according to sex. Roosters live alone or in small groups while the hens gather in flocks of up to 25 birds. The sexes begin to mix in woody cover or dense cattail marshes once the grassy cover fills with snow.

The average distance from summer haunt to wintering area is two-thirds of a mile, but some birds travel over 1½ miles to winter cover. Wintering pheasants usually select good cover with a food source in close proximity. But finding food near good winter cover can be difficult. For this reason, it is not uncommon for wintering pheasants to relocate in marginal cover near a good source of food.



Winter: A Test of Survival

WINTER BRINGS a day-to-day test of survival for ringnecks. Across the prairie farmland, the birds must persevere against weighty odds: sub-zero temperatures combined with winds up to 70 miles per hour, and snowstorms that dump 15 inches of snow. To make matters worse, pheasants must still elude predators in cover that by now has become sparse and scattered.

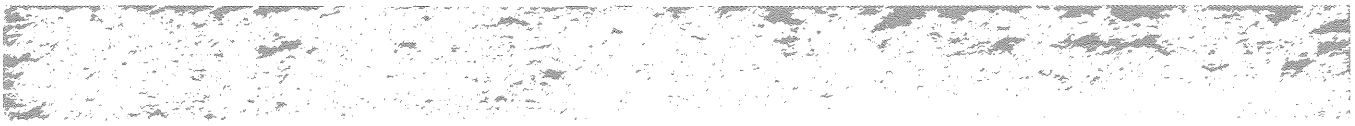
The December pheasant, however, is well-equipped to survive the harsh winter environment. Its large size and strong muscles enable it to move freely over all but deep, fluffy snow. Healthy and strong, the bird is in peak physical condition. Its plumage is thicker than at any time of the year and layers of fat insulate its body, while providing a source of energy.

Despite its ruggedness, the ringneck lacks certain survival traits common to other game birds in the northland. Ruffed grouse and Hungarian partridge will burrow-roost in soft snow, which insulates them from the intense cold. But the pheasant, unless covered by a sudden, heavy snowfall, prefers to roost on the snow or in trees, where more energy must be expended to keep warm. And unlike bobwhite quail and partridge, pheasants will not huddle together to share body heat.

Roost Sites

To conserve energy, pheasants roost in heavy cover where the thick overhead tangle traps the air. Stands of giant ragweed or tall marsh vegetation like cattails, bulrushes, and wild cane provide good roosting, loafing, and escape cover. Many birds roost on frozen wetlands, snuggling into the thickest cattail stands they can find.

When wetlands, drainage ditches, and roadsides fill up with snow, the adaptable ringneck heads for woody cover. Clumps of willows, alders, or other types of brush afford excellent cover. Many birds move into woodlots and



shelterbelts where they roost in evergreen trees, usually 6 to 10 feet off the ground.

Unfortunately, not all woodlots and windbreaks provide adequate winter cover. Only one-third of the state' shelterbelts are of moderate to high value to pheasants. To provide adequate protection from blizzards, a shelterbelt must be at least 150 feet wide, contain an understory of low branches, and have one or more rows of dense shrubs around the north and/or west sides (see diagram on page 43). Windbreaks with four or more rows rows of conifers on the south and east sides are best. The dense boughs break the wind and catch snow, while providing good overhead cover from winged predators.

Pheasant feeding activity is more intensive and concentrated into shorter periods during cold weather, provided that food is readily available. The birds start feeding before sunrise and by mid-morning, have usually settled into dense loafing cover. The most intense feeding period begins in late afternoon and continues until sunset.

In most cases, pheasant roosting sites are within one-fourth mile of feeding areas. The birds seldom move farther than one-half mile from cover to food. Pheasants that must venture far to find food become vulnerable to severe storms, predation, and accidents. Roadkills, for example, often increase when birds are forced to search for food along snow-cleared highways.

Fox, owls, dogs, cats, and other predators are often hard-pressed to catch adult pheasants in summer. But they may find easy pickings when the birds move into the open or when they crowd into light cover.

Rough and Ready

Ringnecks are tough, resourceful characters. During winter, they frequent wind-blown fields where waste grain has been exposed. Where pheasants know the location of a pile of waste grain, they may scratch through 20 inches of compacted snow to get at the food. They also feed on weed seeds, fleshy fruits, and different parts of wild plants when the snow gets deep.

The adaptable birds often congregate around corn cribs and grain bins, move into farmyards to feed among livestock, or pick waste grain from manure spread over a field. In South Dakota, about 85 percent of the pheasants in one study area lived in and around cattle feedlots during a particularly severe winter.

With good cover and a source of food within one-fourth mile, pheasants can resist extremely cold temperatures. At 10° below zero, a healthy pheasant in thick cover can go without food for up to two weeks. Although they weigh less, hens can go without food as long as the roosters.

Food shortages are most common in intensively farmed areas, where fall plowing has turned the

Ron Spomer

Pheasants are more prone to roost in trees during winter.

Chuck Wechsler

Great horned owls take more pheasants during winter than at any time of the year. However, owl predation accounts for less than 10 percent of the total winter mortality.

landscape into a vast sea of black soil. Shut off from their major source of food, the birds begin dying when they drop to about 50 to 60 percent of their normal weight. During periods of extreme cold, starving pheasants will die at even higher body weights.

A starving pheasant is unable to walk or fly normally, and usually dies in its roost. Its breast muscles will be shrunken so that its breast bone, or *keel,* becomes very prominent. It will have little or no body fat, an empty crop and gizzard, and a dark green or black gizzard lining compared to the normal light green. Starving birds may eat straw, parts of cornstalks, manure, and even carrion.

Pheasant survival is usually best during winters with little snowfall. They suffer most during winters with a combination of heavy snows, strong winds, and lengthy periods of extreme cold. Sleet storms can also make the pheasant's life difficult by encasing its foods in ice.

Deadly Blizzards

The worst possible condition for pheasants is a strong weather system that begins with sleet followed by blizzard conditions, and finally, several days of frigid temperatures. A St. Patrick's Day blizzard in 1965 wiped out over half of the pheasant population in two days. The storm dropped 19 inches of snow, which in some areas piled up into drifts 14-feet high. And in the blizzard's wake came several days of sub-zero cold. Another devastating winter storm in 1975 eliminated from 50 to 65 percent of the birds in some areas.

Severe winter storms kill in two ways. Most birds die from being buried within the deep drifts. Pheasants huddled in cattail marshes, brushy wetlands, and other cover that would be perfectly adequate during a normal winter, may be quickly entombed by the drifting snow. In some cases, however, pheasants that become entombed are better off than birds on the surface. If the snow is not too deep, the birds can often force their way out.

Caught in the open or in light cover, a pheasant may die from exposure. The deadly combination of searing winds and sub-zero temperatures may cause ice and snow to build up between the bird's feathers. The plumage no longer insulates the bird. It starts to lose body heat and soon dies. Many birds tolerate the bone-chilling winds just so long, then abandon their hiding spots, apparently to find better protection elsewhere. But once they leave cover, they succumb quickly.

The savage storms of winters past demonstrate the sad plight of Minnesota's pheasant population. Without good cover, many birds will continue to perish in severe winter storms. But with an abundance of good-quality habitat, pheasants can survive the worst nature can dish out and quickly replenish their losses.

Pheasants killed by severe winter storms usually die from exposure after ice and snow accumulate next to the skin, eliminating the insulating quality of their plumage. Barely alive after a particularly devastating blizzard, this hen (upper left) wears patches of snow on her feathers. The rooster (above) was not so fortunate. Note the ice build-up on his back. Pheasants in good cover can withstand the worst nature can dish out. Tracks covering this snowdrift (left) reveal the presence of a large flock of pheasants that survived a severe winter storm in 1975.

Measuring the Resource

THE WILDLIFE professional, like the businessman, must inventory his product to manage it effectively. In Minnesota, wildlife managers keep tabs on the pheasant population through their roadside counts.

DNR's area wildlife managers, biologists, and conservation officers have been conducting roadside surveys every year since 1939. By counting the number of pheasants sighted per 100 miles driven, they can arrive at an accurate estimate of the population trend.

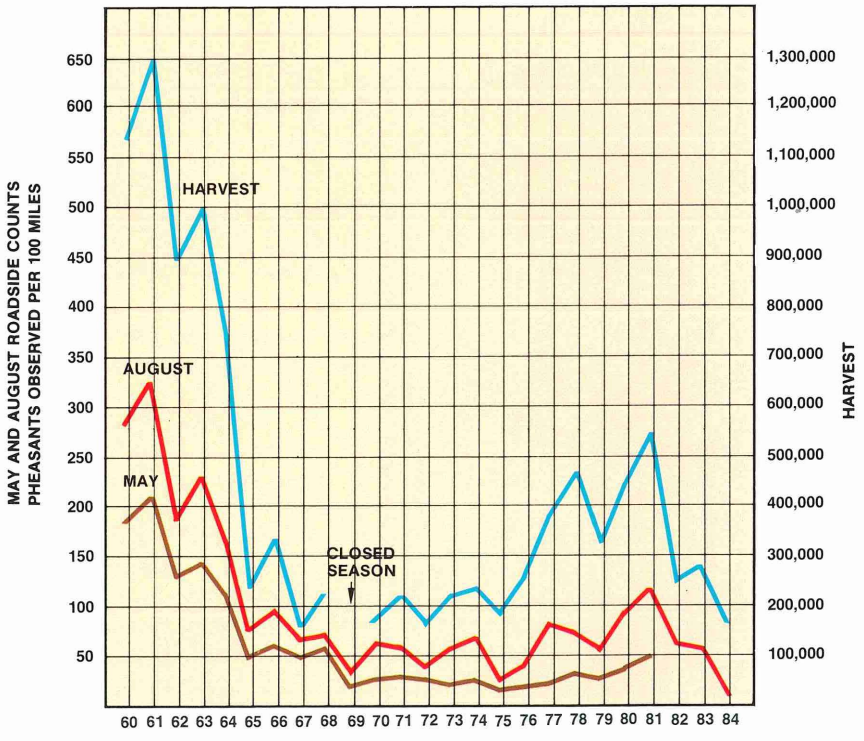
The Spring roadside count provides an index as to the extent of the previous fall's harvest, winter losses, and the current size of the breeding population. In mid-May, observers drive 129 routes (about 4,000 miles) in 64 counties. They run their routes only during ideal conditions—the sky clear to partly cloudy, the wind calm to light, and the vegetation wet with dew. (The wetter the better. Pheasants trying to avoid getting wet move to open areas where they are more easily seen.) Each year, observers begin from designated starting points at one-half hour after sunrise, then drive the same 25-mile routes at 15 to 20 miles per hour, observing and tallying pheasants and other farmland wildlife.

The August roadside count determines the hatching success, enabling biologists to forecast the upcoming pheasant harvest. This census differs from the May counts in several ways. It begins at sunrise and each time an observer spots a hen or chicks, he stops the car to flush the birds. By doing this, the number of hens with broods, and the number and approximate age of the chicks can be calculated.

Data from the roadside surveys help biologists determine the productivity of the pheasant population. During a normal year, about 55 percent of the May hens will have a brood by August. If this percentage is above 65 percent, hunters can expect a better-than-average hunt.

Chicks per brood, although not as helpful as the number of broods per May hen, can be used to predict population trends. The greater the chicks per brood, the better the reproduction and usually the hunting success. The average brood size has declined steadily in recent decades from 6 chicks in the 1960s to 5.5 in the 1980s.

Information from nearly 40 years of roadside counts also provides a historical perspective on pheasant populations and land use. The data reflects the boom years of the 1960s when the Soil Bank program was in its heyday. The continuing decline in the number of pheasants per 100 miles since 1964 reflects the demise of the Soil Bank era, and the steady decline of safe nesting and wintering cover.



This graph shows a distinct correlation between roadside surveys and annual rooster harvests from 1960 to 1984.

The Small Game Harvest Survey

Years ago, wildlife officials relied on voluntary hunter report cards to estimate the annual pheasant harvest. In 1976, they switched to a random survey of small game hunters to provide a more accurate and dependable estimate. The survey also provides data for calculating hunting success for other upland game birds, furbearers, and waterfowl.

Just before the hunting season, the names of about 4,000 Minnesota hunters are randomly selected

by computer. Each hunter is sent a postcard asking him to record the number of days spent afield and the number of animals bagged of each game species. Following the season, a Small Game Harvest questionnaire is sent to the participants.

The success of the survey depends upon how many hunters fill out and return the questionnaires.

The survey provides data on the total number of pheasant hunters, average take per hunter, and where the birds were harvested. Like the roadside counts, the Small Game Harvest Survey reflects the continuing decline in pheasant numbers. In 1976, about 96,000 resident hunters harvested 250,000 pheasants. In 1984, about 85,000 hunters bagged 192,000 birds.

Sixty Years of Hunting Seasons

Year	Season Length in Days	Shooting Hours	Daily Limit/ Pos.		Harvest in 1000s
1924	4	?	3	3	.3
1925	No Season				
1926	17	?	3	12	27
1927	No Season				
1928	18	"Daytime"	3	12	168
1929	No Season				
1930	5-18	Sunrise-Sunset	3*	12*	531
1931	10	Sunrise-Sunset	3	12	1019
1932	4-10	Sunrise-Sunset	3	6	890
1933	4-16	Sunrise-Sunset	3*	6*	1261
1934	9-16	Noon-Sunset	3	6	904
1935	9-20	Noon-Sunset	3*	6**	1378
1936	9-21	Noon-Sunset	3*	6**	1325
1937	9	Noon-5 PM	3*	5*	586
1938	16	7 AM-4 PM	3	5	648
1939	17	7 AM-4 PM	3	6	1134
1940	23	Sunrise-Sunset	3	6	1498
1941	17	7 AM-4 PM	3*	6*	1790
1942	23	Sunrise-Sunset	3*	6*	1749
1943	23	½ hr. before Sunrise-Sunset	4*	8*	1378
1944	23	½ hr. before Sunrise-Sunset	3	6	910
1945	9-23	Noon-Sunset	3	6	784
1946	9-17	Noon-Sunset	3	6	806
1947	No Season				
1948	9	Noon-Sunset	2	4	668
1949	17	Sunrise-½ hr before Sunset	3	6	1128
1950	16	Noon-Sunset	3	6	891
1951	23	Noon-Sunset	3	6	929
1952	17	Noon-Sunset	3	6	1072
1953	9	Noon-Sunset	2	4	593
1954	9	Noon-Sunset	3	6	659
1955	16	Noon-Sunset	3	6	1090
1956	16	Noon-Sunset	3	6	1043
1957	16-23	10 AM-Sunset	3	6	776
1958	30	10 AM-Sunset	3	6	1562
1959	30	10 AM-Sunset	3	6	890
1960	23	10 AM-Sunset	3	6	1164
1961	30	10 AM-Sunset	3	6	1304
1962	30	10 AM-Sunset	3	6	901
1963	36	10 AM-Sunset	3	6	1040
1964	38	10 AM-Sunset	3	6	758
1965	23	10 AM-Sunset	2	4	220
1966	23	10 AM-Sunset	2	4	349
1967	9	10 AM-Sunset	2	4	141
1968	23	10 AM-Sunset	3	6	216
1969	No Season				
1970	16	10 AM-Sunset	2	4	166
1971	32	Sunrise-Sunset	2	4	220
1972	34	Sunrise-Sunset	2	4	188
1973	30	Sunrise-Sunset	2	4	212
1974	30	Sunrise-Sunset	2	4	235
1975	30	Sunrise-Sunset	2	4	188
1976	30	Sunrise-Sunset	2	4	250
1977	33	9 AM-Sunset	2	4	397
1978	33	9 AM-Sunset	2	4	468
1979	37	9 AM-Sunset	2	4	328
1980	37	9 AM-Sunset	2	4	466
1981	44	9 AM-Sunset	2	4	573
1982	44	9 AM-Sunset	2	4	265
1983	44	9 AM-Sunset	2	4	272
1984	44	9 AM-Sunset	2	4	192

** One hen was permitted in the daily bag and possession limit.*
*** Two hens were permitted in the possession limit.*
Note: Where two figures appear under "Days of Hunting," it indicates zoning within the pheasant range. Longest seasons were typically in the southwestern counties. Hunting has been permitted statewide since 1951. From 1932-1933, and since 1957, hunting has began at noon on opening day.

Managing the Hunt

Chuck Wechsler

THE GAUDY ring-necked pheasant has long been a favorite of Minnesota sportsmen. Over six decades of hunting seasons, Minnesotans have taken more than 50 million ringnecks. These annual hunts provide countless hours of recreation and pump millions into the state's economy. Immeasurable are the precious memories of autumn hunts, when the sounds of cackling roosters and excited hunters fill the air.

Annual cocks-only seasons remove a large percentage of the surplus roosters, regardless of the population level. Each fall, Minnesota hunters take about 65 percent of the cocks. However, only 10 percent of the roosters are needed for reproduction the following spring. The reason is that pheasants are *polygamous,* which means that one male will mate with many hens. In a study of captive birds, for example, one cock bred with 50 hens. Studies of wild pheasants have revealed sex ratios as high as 29 to 1. In Minnesota, the spring ratio is typically 3 to 1.

After more than a half-century of pheasant management, biologists know that it is virtually impossible to overharvest roosters. The annual cocks-only harvests falls short, not because of hunting regulations, but by the age-old law of diminishing returns. About 85 percent of the total rooster kill occurs during the first half of the season. As the season progresses, the remaining cocks become smarter and harder to find, weather conditions become tougher, and hunting pressure drops off sharply. The end result is that we underharvest our roosters.

Because of the law of diminishing returns, Minnesota's hunting regulations are geared more toward managing people than pheasants. Let's see why.

Season Length

Minnesota has traditionally had shorter hunting seasons than neighboring states, and we harvest a lower percentage of our roosters. Even in 1958, when the pheasant population soared to six million birds, hunters were allowed only 30 days of shooting. But then and now, the pheasant season could run at least four months without overharvesting the roosters.

The size of the pheasant population determines the total kill, not the season length. Year after year, the number of roosters bagged correlates with the August roadside count. During years when pheasants are abundant, up to 75 percent of the cocks may be harvested, simply because more hunters go afield when there is a large number of birds.

Restricting the season length has traditionally hinged more on sociological aspects than on biological facts. For example, some farmers and private landowners are opposed to having hunters in their fields over a 60- or 90-day season. And many well-intentioned hunters and their organizations have mistakenly fought to keep the season short to protect the pheasant resource. They forget that it is virtually impossible to overharvest roosters.

Short hunting seasons rob hunters of many enjoyable hours afield. In fact, a growing number of sportsmen prefer late-season hunting. Most of the crops have been harvested, there are fewer competing hunters, and rural landowners are more inclined to grant permission to hunt. The cover is easier to walk through and many wetlands are frozen, enabling hunters to reach islands and other isolated spots that hold birds. Late-season hunters also enjoy the challenge of pursuing roosters that are considerably warier than opening-day birds.

Fortunately, times and attitudes are beginning to change. Since 1981, Minnesota has held its longest seasons in history, 44-day hunts that ran from mid-October to early December. The 1984 season was conducted at a time when the spring breeding population had plummetted to about 500,000 birds, the lowest figure in over a half-century. But even with the longer season, only 60 to 65 percent of the roosters were harvested.

Shooting hours

Much of the same reasoning that has kept our seasons short has also led to restricted shooting hours. There is no biological reason for restricting hunting hours. Sunrise to sunset shooting would not have a detrimental impact on the breeding population. But some believe that early shooting hours might prove disruptive to the farmer awakened by a hunter asking permission at 7 o'clock on a Sunday morning. As a result, 9 a.m. to sunset shooting hours were legislated. It should be emphasized, however, that the farming community is quite willing to support hunting. In fact, about one out of every two farm families has at least one hunter.

Bag Limits

The largest daily bag was in 1943 when four birds (three cocks and one hen) were allowed per hunter. For the next two decades, the daily limit in most years was three cocks with a possession limit of six. The daily bag was reduced to two in 1965 and has remained at that figure ever since, except in 1968.

A popular misconception is that daily bag limits are set to correspond to pheasant population levels. But the main purpose of the daily limit is to distribute the pheasant harvest over more of the season and among more hunters. About 55 percent of the total rooster kill occurs on opening weekend and about one in every

Daniel J. Cox

Late-season hunting provides special enjoyment to many Minnesota sportsmen.

eight hunters takes home a 2-bird possession limit. If the bag were increased to three cocks, about 65 percent of the harvest would occur on opening weekend, although the percentage of hunters that limit out would decline somewhat. But most important, there would be fewer birds for late-season hunters.

Closed Seasons

When the pheasant population takes a nose-dive, invariably some concerned sportsmen ask to close the hunting season. But closing the season deprives hunters of important recreational opportunities. With our complex, stress-inducing lifestyles, hunting gives us a chance to rekindle our spirits, to maintain our rural roots, and to strengthen friendships and relationships with companions and families.

Closing the season also stands in direct contrast to important biological principles: *roosters cannot be overharvested, nor can they be stockpiled from one year to the next.* We've already examined the first principle, now let's review two case studies that illustrate why pheasants cannot be stockpiled.

The winter of 1968-69 was the worst in 30 years for Minnesota pheasants. By the following spring, the breeding population had been reduced to only 35 percent of that from 1968. Concerned about the drastic decline, the public exerted enough pressure to have the 1969 hunting season closed, eliminating an estimated 1.1 million man-days of hunting. Meanwhile, the northern one-third of Iowa experienced a similar decrease, but maintained a 54-day cocks-only season.

In spring 1970, Minnesota's roadside census revealed a substantial increase in the pheasant population. Northern Iowa, meanwhile, recorded a similar increase, despite its long hunting season and a daily bag limit of three roosters. If cocks-only hunting had an adverse effect on pheasant numbers, then Iowa's spring population index should have increased at a lower rate than the Minnesota index. But it did not.

An experiment in Douglas County in west-central Minnesota provides additional evidence that closing the season wastes roosters and recreation. During the Soil Bank era, the county supported a large number of pheasants. But the demise of Soil Bank, combined with severe winters, reduced pheasant numbers by as much as 95 percent in some areas of the 723-square mile county.

In 1972, the Viking Sportsmen's Club, one of the state's most dedicated and hard-working conservation clubs, successfully lobbied to close Douglas County during the 1973 season, and to have the DNR cooperate on a pheasant stocking program.

Hunting remained closed in Douglas County from 1973 through 1975. During this period, sportsmen stocked over 5,000 pen-raised pheasants, or about 7.7 pheasants per square mile per year. During the same period, the other 13 counties in west-central Minnesota remained open to hunting and were stocked with 0.6 pheasants per square mile. At the end of the experiment, May and August roadside surveys revealed that the population trend in Douglas County was no different than in the surrounding counties.

Shooting of Hens

Another argument for increasing pheasant numbers is to shorten the cocks-only season to protect hens from illegal shooting. A gaudy rooster is normally quite easy to recognize, but there are situations, such as a bird flushing toward the sun, when honest hunters make mistakes. And, there are a few irresponsible types who shoot hens out of frustration or for some other inane reason.

The illegal hen kill, however, too insignificant to make difference in pheasant production. Biologists estimate the illegal kill at somewhere between 3 and 15 percent of the hen population. But as long as the total remains within this range, illegal killing of hens will have little or no affect on the breeding stock. The reason, of course, is that pheasants have a short life span—only 30 to 35 percent of the adult birds survive from one year to the next, regardless of whether or not they are hunted.

Stocking Pheasants

For many years, public clamor for initiating stocking, predator control, and winter feeding programs have been a thorn in the side of wildlife managers. Although these programs have been relatively popular with the public, they tend to divert the DNR's limited budget and manpower away from efforts to provide pheasants with balanced habitat.

The general public often points to artificial stocking as a way to put more birds in the bag. Over the years, DNR wildlife managers have extensively researched the practice of stocking pen-raised pheasants. Let's review the three types of stocking programs and the problems inherent in each.

Introductory stocking is trying to establish a new species where good habitat exists. The introduction of the ringneck in Minnesota some 80 years ago is a remarkable success story. Stocking worked at that time, because the newly-introduced birds found a super-abundance of habitat and they did not have to

Programs to control fox and other predators can be difficult and costly. Better yet, say wildlife managers, provide farmland wildlife with abundant habitat.

compete with an existing population of wild birds. But times have changed. Pheasants now live in virtually every piece of suitable habitat. Attempts to introduce pheasants into habitats like the coniferous forests of northeastern Minnesota or the peat bogs of the northcentral counties, would be pure folly.

Maintenance stocking is attempting to maintain or enhance an existing pheasant population by stocking additional birds. In the past, DNR biologists have trapped wild pheasants, then raised their offspring for releasing in areas where severe weather had nearly decimated the wild birds. But these efforts were costly and did not produce good results.

Stocking pen-raised birds is an even bigger waste of time and money. Each piece of habitat has a *carrying capacity,* or a maximum number of pheasants that it can support. The carrying capacity varies from season to season and year to year, largely depending on the quality of the habitat. Dumping additional birds into areas that have already reached their carrying capacity is futile, unless the habitat base—including nesting and wintering cover—can be expanded.

The shock of being placed in a totally new environment and having to find food and cover is apparently too much for most pen-raised pheasants. Game farm birds also lack an in-born wariness and are vulnerable to predators. A South Dakota study found that less than 7 percent of the roosters released in summer were harvested in fall. Only 4.8 percent of the released birds survived through winter. Another study in Wisconsin revealed that even if stocked hens make it through the winter, they produce almost no chicks (.4 to .8 young per hen) the following spring. In simple terms, if wild pheasants are having trouble surviving in what little habitat remains, game farm birds would have even less chance.

Put-and-take stocking involves releasing pheasants just prior to the season opener or just before a weekend. Its purpose is simply to provide extra shooting for hunters. New Jersey is among several eastern states that provide limited put-and-take shooting. Since 1965, the state has raised and released an average of 65,000 pheasants each year, at an annual cost of nearly $700,000. Game officials stock the birds only in state wildlife management areas, which often become overcrowded with hunters. To ease the congestion, New Jersey has established controlled hunts on some areas. Hunters must register and wear arm bands as identification, so game officers can control hunter density.

Minnesota wildlife managers are in the business of producing birds in the wild; they would rather leave put-and-take shooting to private enterprise. The state currently issues about two dozen licenses to private shooting preserves that offer that type of hunting.

Chuck Wechsler

Quality hunting can result only if farmers and wildlife managers provide quality habitat.

Predator Control

Fox, skunks, raccoons, owls, and other predators destroy innumerable pheasant nests and kill many adult birds. For this reason, predator control seems an obvious panacea for increasing pheasant numbers. But is it?

From 1959-1962, Minnesota biologists trapped up to 25 predators per square mile from a nine-square mile study area. The results were surprising. Nest destruction was sliced in half and the pheasant reproductive rate doubled. But equally surprising, the effort did not foster any increase in the number of chicks observed during August roadside counts, nor did it produce more roosters for hunters. The reason? Gains made by predator control were offset by adverse weather and habitat losses.

In the study, the cost of removing each predator was about $21, or $4.50 per chick. Considering that only half of the chicks reach maturity, the cost per mature bird is double, or $9. And because only half of the autumn birds are roosters, the cost doubles again to $18 for a rooster that may or may not be shot. The biologists also noticed that within one year after trapping ended, predator populations rebounded to previous levels.

An experimental predator management program in South Dakota also documented a substantial increase in pheasant numbers, but only after the predator population was severely reduced. And South Dakota biologists discovered that the only effective way to achieve widespread predator control was to poison virtually every mammalian predator in their 100-square-mile study area.

The upshot of both studies is that maintaining an extensive, ongoing predator management effort over the 64-county pheasant range would be enormously expensive; any benefits would be vastly overshadowed by the costs. In fact, the amount of money needed to finance such a program would probably exceed $10 million per year! If wildlife managers could apply that same amount toward an annual program of habitat acquisition and enhancement, our pheasant problems would be over-for good.

Winter Feeding

The pheasant is quite capable of fending for itself. During severe weather, the birds usually remain in their roosts, sometimes going without food for a week or more. Once the storm passes, pheasants find waste grain in the wind-swept fields or dig down through the snow to find food. Many birds frequent the estimated 10,000 acres of food plots on state and federal wildlife areas, or the thousands of food plots and feeder cribs set up by sportsmen's clubs.

But when deep snows (12 inches or more) arrive early and blanket the pheasant range for prolonged periods, the birds may begin to die off. If these conditions are magnified by extensive fall plowing, low temperatures and high winds, pheasant losses can be enormous and swift. Conditions such as these persisted from late November, 1983, to the following February. In response, the DNR declared its first pheasant feeding emergency campaign in 22 years. The operation was widely supported by sportsmen's clubs, farmers, grain companies, and the United States Department of Agriculture.

To feed a significant portion of the state's pheasants in 1983-1984, each of which consumed four ounces of food per day, required 3,232 tons of corn. The value of donated food, primarily corn, was over $200,000. Bagging and shipping costs exceeded $58,000.

For emergency feeding to work, pheasants must receive food within one week after their food sources are lost. After that, feeding must be continued through the critical period, which usually means the remainder of winter. The reason is that pheasants quickly become dependent on the artificial food source and lose their desire to look for other food supplies.

The major reason behind winter feeding is not to keep the birds' stomachs filled with corn, but to use food as a means of holding pheasants in good cover, where they have a better chance of surviving severe weather.

The best method of emergency feeding is to place ear corn in special feeder cribs near good winter shelter, preferably a thick shelterbelt fringed with conifers, or a dense stand of cattails or cane. The crib should be a short distance from cover, located where the wind will keep it free of snow, or where the birds were feeding before the storm hit. Shelled corn can also be used.

John A. Scharf

This crib feeder attracts pheasants from a nearby wetland. Dense stands of cattails and scattered clumps of willows in the marsh provide excellent winter cover.

Bringing Back the Ringneck

FOR THE PAST half-century, modern agricultural practices have thwarted public and private attempts to improve pheasant numbers. As more and more wildlife lands were converted to intensive row-cropping, pheasant numbers began their inexorable decline, despite the best efforts of wildlife managers. Today, Minnesota's pheasant population is only 15 percent of what it was in 1960.

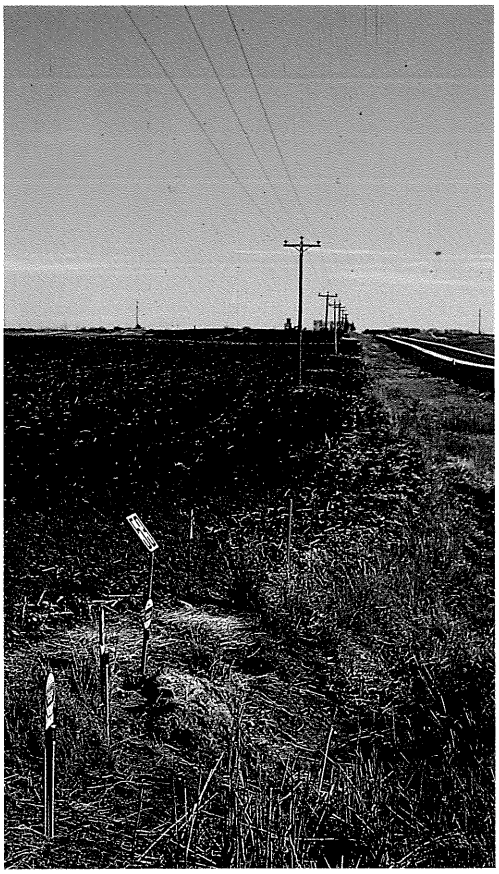
Returning the ringneck population to the levels of yesteryear has become one of the most complex and vexing challenges in wildlife management. The solution is obvious: Simply provide ample amounts of good nesting habitat and winter cover near dependable food supplies. But the problem is that pheasants fare best on the same rich farmlands that produce bumper crops of corn and soybeans. Faced with making a choice, most landowners gear up for crop production and leave the pheasant to fend for itself.

Can we reverse the continuing decline in pheasant numbers? Can we introduce management programs that will affect enough acres to significantly increase the pheasant population? And what can we do—as rural landowners, hunters, and concerned citizens—to help the ringneck on the road to recovery.

In this section, we'll review past and present land use programs to provide some insight into the rise and fall of the ringneck. We'll also outline various wildlife habitat projects to help maintain reasonable populations of the magnificent game bird.

Charlton Photos

Ken Varland



Right: Extensive agricultural practices, like fall plowing and farming of roadsides, has all but eliminated pheasant habitat in many parts of the pheasant range. Far right: This farmland setting reflects man and nature living in harmony. Note the variety of crop types, contour farming, grassy patches of cover, woodlots and windbreaks, and ample wetlands.

Pheasants & Public Lands

CURRENTLY, at least one-third of our ringneck chicks are hatched on roadsides, state Wildlife Management Areas, federal Waterfowl Production Areas, and Water Bank projects, yet these lands account for less than five percent of the total land area in Minnesota's pheasant range.

Wildlife Management Areas

The best long-term habitat program in Minnesota is the DNR's extensive network of Wildlife Management Areas. The state has about 1,000 WMAs encompassing some 875,000 acres. About two-thirds of the units, or 260,000 acres, are within the pheasant range.

Our system of wildlife areas is the showcase for the nation's first wetlands acquisition effort. Originated in 1951, the "Save the Wetlands" program conserves wetlands and adjacent uplands to enhance waterfowl production. But wildlife areas are also managed for other game species, including pheasants. Almost all are open to public hunting.

In many counties, Wildlife Management Areas account for a significant share of the best habitat. Wildlife managers plant legumes or native grasses to provide hens with a safe nesting alternative to private alfalfa fields and croplands. They also plant shrubs and evergreens for winter cover and establish food plots for wintering birds.

A 40-acre wildlife management area can carry a winter population of 200 or more pheasants. Come Spring, many of these birds disperse to other lands, hopefully with adequate nesting cover. These lands, together with the wildlife area, can provide additional hunting for many sportsmen.

Bureau of Information & Education, MDNR

Grassy roadsides can be a boon to pheasant production.

Roadside Management

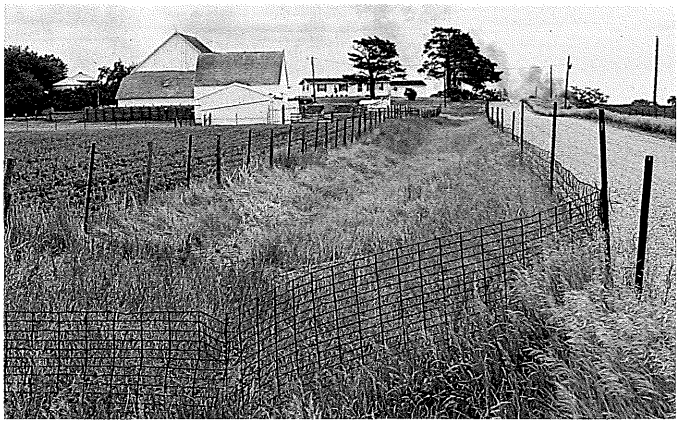
Investing in our system of public roadsides could pay big dividends in terms of pheasant numbers. About 76,000 miles of federal, state, county, and township roads criss-cross the 64 counties in pheasant country. If properly managed, our one-half million acres of roadsides could produce twice as many ringnecks as they now do.

Wildlife biologists have counted as many as three nests per acre in managed roadsides, one of the highest nesting densities of any habitat type. Dense, erect stands of grasses and legumes provide good early-season nesting habitat. And if left unmowed, these lush stands are three times as attractive to nesting birds than mowed roadsides.

Each spring and summer, however, between 40 and 70 percent of the nesting habitat in roadsides is destroyed or disturbed by mowing, spraying, burning, off-road vehicles, or some type of farming encroachment. Slightly over 40 percent of the roadside habitat occurs along townships roads and nearly half of these ditches (about 25,000 acres) are affected by encroachment.

About half of our roadsides are mowed during May, June, or July, when most hens are nesting. Many rural landowners mow in an effort to check the spread of noxious weeds. But studies have proven that dense stands of grasses and legumes tend to choke out weeds, and require little spraying if properly seeded. Particularly

All Photos by Ken Varland



Clockwise from upper left: mowing, burning, encroaching farm operations, and grazing—all destroy roadside habitat, not to mention destroying wildlife outright.

troublesome spots can be spot-sprayed or spot-mowed, rather than cutting the entire roadside.

Another concern is that tall grass in a flat roadside will cause snow to pile up on the road. But if roadsides are mowed after August 1, the vegetation rarely grows tall enough to catch drifting snow. Cutting one or two swaths along the road shoulder will eliminate any build-up.

Roadsides benefit more than 40 species of birds and mammals, including pheasants. The DNR's roadside wildlife specialist is working to make people aware of this fact, as well as to improve habitat conditions.

Technical assistance is provided to landowners and roadway authorities concerning seeding mixtures, planting techniques, and proper management.

Although many roadsides offer good nesting cover, about 150,000 to 300,000 acres provide only poor to fair nesting habitat. The DNR's roadside specialist has developed a seeding program to improve nesting habitat at various locations. Demonstration plots show how proper roadside management can provide for the needs of wildlife, as well as rural residents. Planting native switch grass, for example, can provide good nesting cover, while crowding out problem weeds. This warm-season grass is not suitable for mowing until late summer, allowing hens enough time to bring off their broods.

Roadside management efforts have increased farmland wildlife populations in states like Illinois, Nebraska, South Dakota, and Ohio. In an Illinois study area, pheasant numbers were two to three times higher in managed roadsides. With the support and cooperation of rural landowners and local units of government, we can achieve the same results in Minnesota.

Waterfowl Production Areas

The U.S. Fish & Wildlife Service manages some 700 Waterfowl Production Areas. Almost all of the 125,000 acres are in the pheasant range, most in west-central Minnesota. WPAs are similar to state Wildlife Management Areas. They cater primarily to waterfowl, but pheasants benefit from many acres of undisturbed nesting cover on surrounding uplands. Most WPAs are open to hunting.

Pheasants & Private Lands

THE KEY to improving pheasant numbers lies with the farmer. By helping rural landowners to provide more and better wildlife habitat on their lands, we could once again have a bumper crop of pheasants.

Throughout the state's farm belt, the landscape continues to change from small, diverse, livestock and multiple-crop operations to large farms planted almost entirely to corn and soybeans. Today, there are 70,000 fewer farms than 40 years ago, while the average size of each farm unit has grown from 171 to 291 acres. And more and more land is being put into crop production—from 20.9 million acres in 1940 to 23.5 million in 1981, despite the fact that many tillable acres are being converted to new roads, shopping centers, and other developments.

Certainly, no one wishes to fault the farmer for these changes. The economic forces working against the farmer are not of his making. His business has become a million-dollar investment in which one acre of land may cost thousands of dollars and a single tractor up to $100,000. In the face of such staggering figures, most farmers find it difficult to sacrifice income for pheasants.

This conflict between farm economics and wildlife is nothing new. In the 1920s, Aldo Leopold, the father of modern wildlife management, wrote that it is vital to "recognize the landowner as the custodian of public game...and compensate him for putting his land in productive condition. Compensate him either publicly or privately, with either cash, service or protection, for the use of his land and for his labor, on condition that he preserves the game seed and otherwise safeguards the public interest. In short, make game management a partnership enterprise in which the landholder, the sportsman, and the public each derive appropriate rewards."

Applying Leopold's visionary thinking, we must find ways to help the farmer's economic plight, while protecting our lands, waters, and wildlife. To date, the best vehicle for carrying out this goal has been the federal farm program.

Fifty Years of Farm Programs

Federal land retirement programs have been influencing the American farm community for more than a half-century. They are administered by the U.S. Department of Agriculture and its two agencies: the Agricultural Stabilization and Conservation Service (ASCS), which distributes the funds allocated by Congress; and the Soil Conservation Service (SCS), which provides technical assistance for planning and engineering these programs.

Farm programs were created to remove land from production, thus controlling overproduction and improving grain prices. They were also designed to protect soil resources, and usually, what is

John A. Scharf

Ringnecks fill the air in this 1960 photograph. The birds were packed into corn stubble enrolled in Soil Bank.

good for the soil is good for wildlife.

Since 1934, several farm programs have come and gone, but only three have fulfilled their charge—to benefit soil and water resources and wildlife habitat. These included the Agricultural Conservation Program of 1936-1953; Conservation Reserve (Soil Bank), 1956-1972; and Cropland Adjustment Program, 1965-1977.

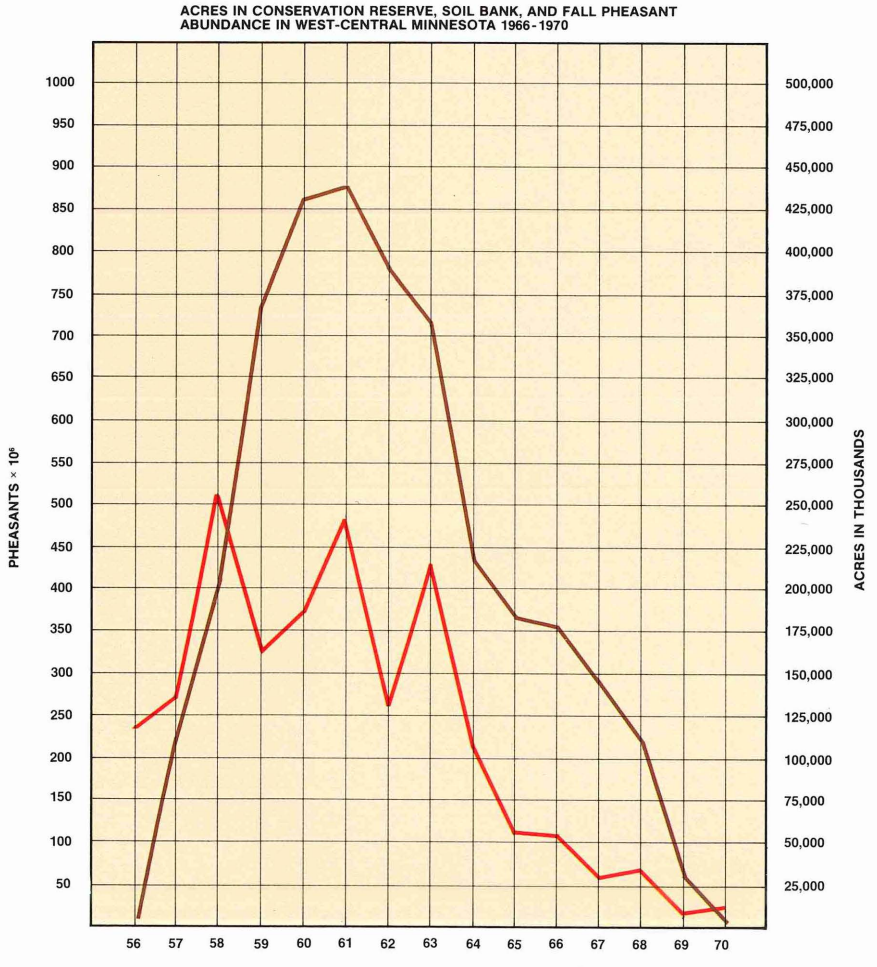
Of the three, the most significant was Soil Bank. Established in 1956, Soil Bank offered up to 10-year contracts to landowners for retiring their lands from crop production. Farmers were required to plant and maintain grass, legume, or grass-legume cover on idled cropland, ideal nesting cover for pheasants.

In Minnesota, Soil Bank acreage peaked in 1960, when over 1.9 million acres were retired under 3- to 10-year contracts. It is no coincidence that Minnesota hunters usually harvested over one million roosters a year in the late 1950s and early 1960s. Soil Bank was discontinued in 1963, though some contracts remained in effect until 1972.

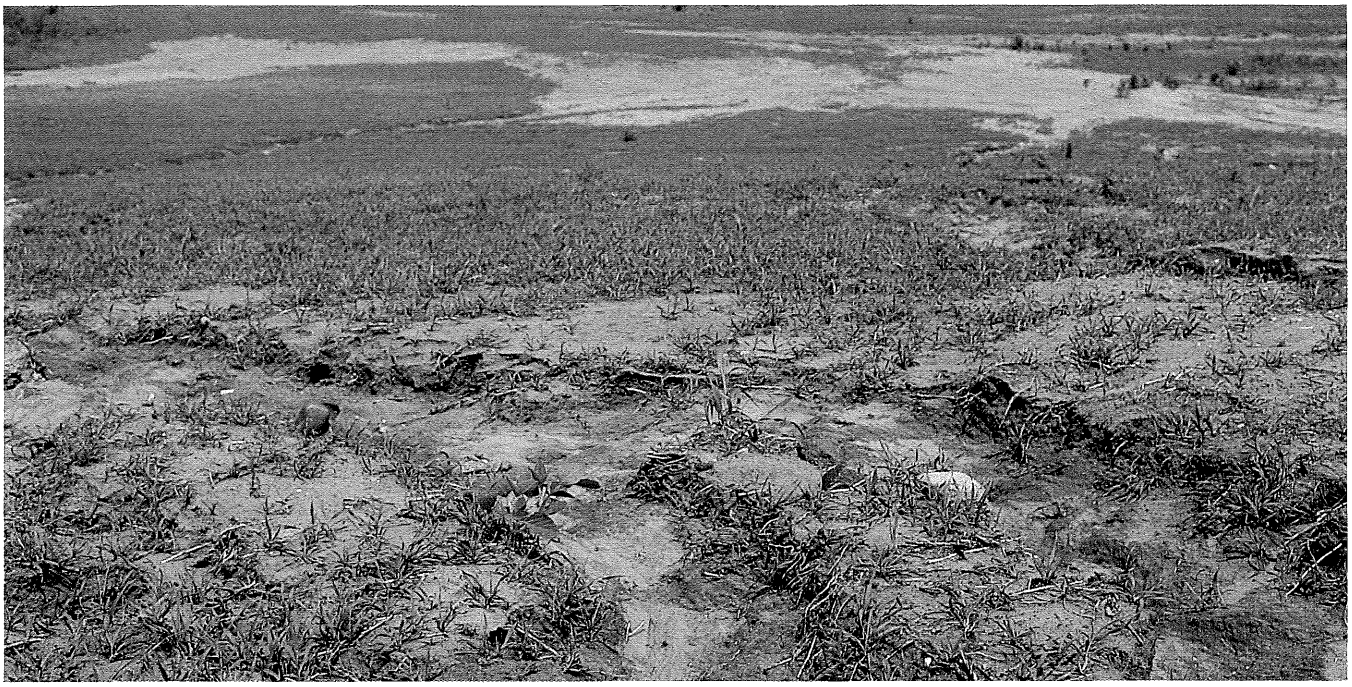
Since 1961, the USDA has emphasized annual land retirement programs, like the Feed Grain Program. The cover requirements of these programs have been minimal. Retired, or *set aside,* acres do not have to be seeded until June 1 or later, if at all. In addition, seeded acres must be destroyed before the cover crop matures. As a result, any cover on these acres is removed just as wildlife begins to find it useful. This type of management not only destroys needed habitat, it results in substantial losses of nests and young to farming operations. Equally important, it exposes the soil to nine or ten months of erosion.

In 1983, the Acreage Reduction Program (ARP) and Payment-in-Kind (PIK) programs captured considerable attention because of the large total acreage retired (about 80 million acres) and their high cost (over $20 billion). But little attention has been given to their impact on soil resources and wildlife.

A 1983 survey of ARP and PIK acres in 12 Great Plains and Midwestern states documented the shortcomings of these programs. The study found that only 7 percent of 43.3 million acres had the grass or grass-legume cover so badly-needed by pheasants and other wildlife. Twenty-one percent had no cover at all. Over 40 percent of the set-aside lands was covered with stubble residue or volunteers plants when checked in mid-June; most of these lands were disked black by mid-July. Only 32 percent had an annual cover seed crop, and most of these acres were seeded later and destroyed before the grain matured, an ASCS requirement. Overall, they provided little cover for wildlife and often aggravated soil erosion problems.



This graph reveals the steady decline of pheasants (shown in red) and set-aside acreage in 10 west-central counties (brown) of Minnesota.



John A. Scharf

Both Photos by Al Berner

Top: Failure to plant a cover crop early enough led to severe erosion problems on this Payment-in-Kind acreage in Pope County. Middle: This land in Martin County, though enrolled in the Feed Grain Acres program, had no cover crop by late June, almost two months beyond the planting deadline. Bottom: A dense stand of oats, planted on Feed Grain acreage in Martin County, provided excellent nesting cover for pheasants.

Problems, Problems, Problems

The major problem with present land retirement programs is that they penalize the best farmer-conservationists. A farmer's eligible set-aside acreage is determined by his history of total crop acreage. The farmer who plants every square foot of soil to corn or other feed grains accumulates a larger base acreage. The larger his base acreage, the greater his financial benefit and the more acres he can place in land retirement programs. This encourages landowners to discontinue crop rotation and to bring erodible lands into production to increase their base. The end result is that they get paid to retire lands that should never have been brought into production in the first place. Moreover, acres on which a farmer places soil conservation measures, or those left in pasture, are not included in his base. Likewise, acres put into legumes for crop rotation purposes lower the base.

Another problem is the uncertainties over today's annual farm programs, which makes it difficult for farmers to plan from one year to the next. As a result, many prepare all their acres for planting each year, exposing even retired acres to 8 to 12 months of wind and water erosion.

Finally, policies that allow summer fallowing and late seeding, and that require early destruction of cover on retired acres, show a lack of concern for soil conservation and wildlife habitat. These acreages result in large tracts of unsafe nesting and brooding cover.

Wildlife surveys since 1972 indicate that less than one-third of the total set-aside acres provide average to good wildlife habitat—in 1983, it was only 18 percent. A Minnesota study showed that with all other factors constant, 30 percent fewer chicks would be observed if set-aside acres were present and attracting hens into large tracts of unsafe nesting cover.

But this need not be the case. A 1970-1975 study in south-central Minnesota showed that spring hen populations could be increased by 83 percent in two years on properly managed set-aside acres. This increase was accomplished by leaving about 12 acres of undisturbed grass-legume cover and 12 acres of undisturbed small grains per square mile to provide nesting and roosting cover for pheasants.

If we could convert two million acres of Minnesota's surplus and erodible croplands to grass-legume cover, pheasants would have 40 to 50 acres of quality nesting habitat per square mile. This acreage, if combined with good roadside management and sufficient winter food and cover complexes, would increase pheasant numbers to the point that hunters would again harvest one million birds.

The future? Federal farm programs will affect the nation's farmers and farmland wildlife for many years to come. Therefore, these programs must be restructured and redirected so they not only control surplus commodities, but also conserve our soil, water, and wildlife resources.

Conservation Objectives

The Natural Resource Council, Midwest Association of Fish & Wildlife Agencies, and Wildlife Management Institute have developed the following multiple-benefit objectives for land retirement programs.

1. Incorporate language into land diversion or related agricultural programs that ensures conservation features.

2. Eliminate federal incentives, including tax credits, that encourage conversion of noncroplands to crop production. Noncroplands should include acreages devoted to rangelands, grassed waterways, terraces, windbreaks, wetlands, and other natural wildlife habitats.

3. Require a multi-year acreage set-aside on at least 20 percent of the current base acreage to include the most highly erodible cropland for each commodity. In addition, examine and realign the criteria and use of the base acreage to be sure it promotes integrated conservation/commodity soil and water management.

4. Provide a more reasonable planning horizon for farmers and ranchers by requiring a long-term conservation reserve, such as up to 20 years, with permanent features for removing fragile, erosive lands from cropping.

5. Require that suitable cover be established on multi-year set-aside acreages, by providing incentives, including funds, to help establish perennial vegetation. Established vegetation should be maintained by appropriate management throughout the contract period.

6. Require that mowing or grazing of established vegetation should be timed to benefit wildlife, such as nesting birds, except in counties where national emergencies are declared because of drought or other causes. This feature has been widely abused in the past.

7. Ensure participation of conservation, water quality, forestry, fisheries, wildlife, and other interests in deliberations of and actions taken by USDA at national, state, conservation district, and county levels.

8. Ensure broad public understanding of the realigned acreage set-aside program, with strong emphasis placed on integrated commodity/conservation tillage.

9. Continue the policy of allowing landowners to manage recreational access, including charging use fees on set-aside lands.

Cost-sharing for Wildlife

EACH YEAR, many landowners give wildlife a helping hand. Some make a major commitment to wildlife, each in a different way and for different reasons. Most all of these farmer-conservationists take advantage of cost-sharing programs for establishing and maintaining our soil and water resources, while improving wildlife habitat in the process.

The DNR's Wildlife Habitat Improvement Program, or WHIP, is one of the largest private lands habitat programs in the nation. Each year, over $900,000 is funneled into various projects to help landowners establish prime wildlife habitat.

In 1984, revenue for the private lands program was derived from the following sources: $500,000 in Pheasant Habitat Improvement Stamp funds; $150,000 from the Deer Habitat Improvement account; $120,000 from the Game & Fish fund; and over $150,000 from organizations like the Minnesota Waterfowl Association, Pheasants Forever, Pheasant Habitat Inc., and the Minnesota Association of Farmers, Landowners and Sportsmen.

The federal government's current Agricultural Conservation Program (ACP) reimburses landowners up to 80 percent of the cost of establishing some 20 kinds of habitat projects. The program is administered by the ASCS.

Landowners can be reimbursed for keeping their wetlands through the federal and state Water Bank programs and Minnesota's Wetlands Tax Credit & Exemption program. Meanwhile, the Native Prairie Tax Credit Program helps to conserve prairie grasslands, many of which are used by nesting pheasants. The DNR's Soil and Water Conservation Districts also provide cost-sharing and technical assistance for improving or developing habitat.

Cost-sharing is available from several sources for establishing or maintaining wildlife habitat in four general areas: nesting cover, woody cover, wetland restoration, and food plots.

Nesting Cover

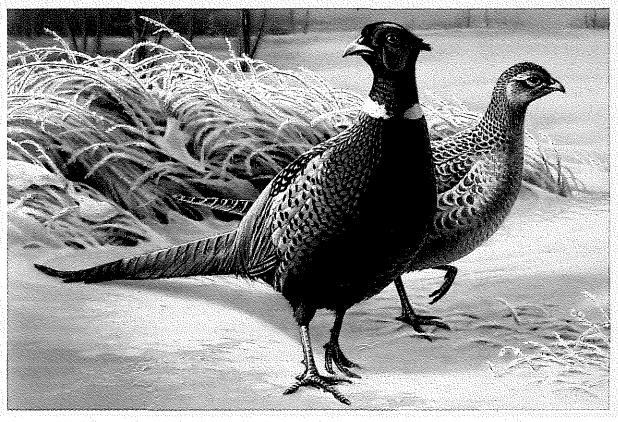
The lack of residual grasslands, which provide safe, secure nesting and roosting cover, looms as the biggest roadblock in the way of improving pheasant numbers. To offset this problem, Department of Natural Resources' cost-share practices tackle both the shortage of quality grasslands and their untimely disturbance.

Throughout the pheasant range of southern and western Minnesota, nesting cover agreements are concentrated near WMAs, WPAs, and Water Bank projects, primarily to enhance the productivity of these habitat areas.

New seedings of grass-legumes or warm-season grasses in former croplands, or in old pastures with poor stands of brome or bluegrass, qualify for cost-sharing. The DNR provides both establishment and rental payments for such seedings. Ungrazed pastures with good stands of grasses and forbs can qualify for rental payments.

In many cases, DNR cost-sharing strives to maximize the potential of lands retired under federal farm programs or federally cost-shared under ACP soil and water conservation practices, such as Water Bank.

Landowners with ungrazed native grasslands can qualify for *Native Prairie Tax Credit.* This program has provided landowners with $100,000 annual tax credits for 11,000 acres of prairie. Minnesotans who own native grasslands are encouraged to contact their local county assessor.



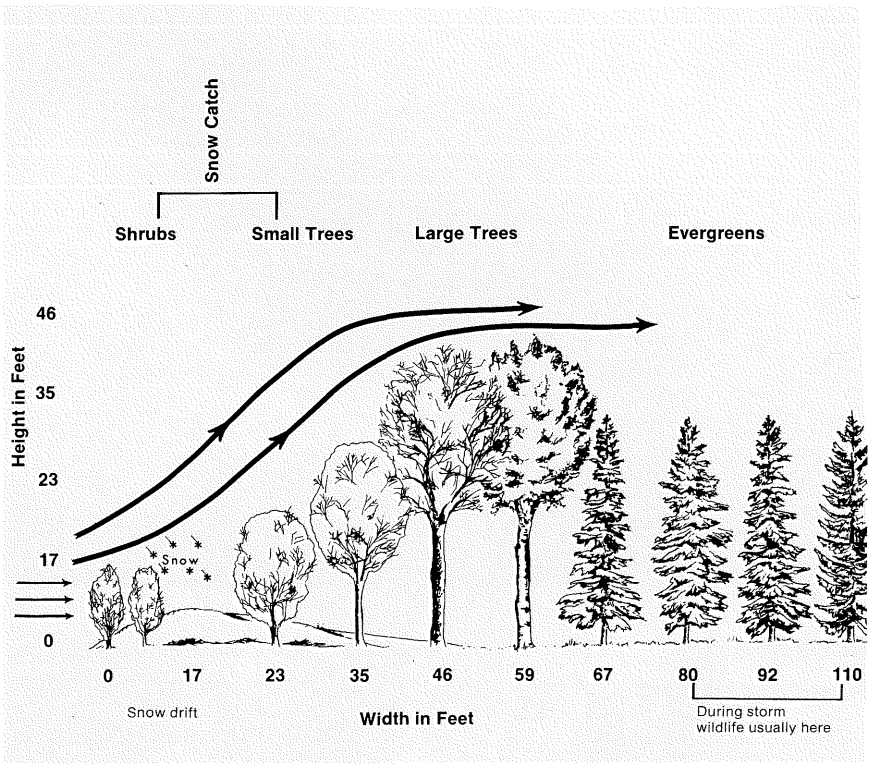
Woody Cover

A well-designed shelterbelt will cut the force of the winter wind, saving over 30 percent on your heating bills and keeping snow from drifting into your yard. It will also provide excellent winter cover for pheasants and songbirds, and beautify your home site.

Check with DNR wildlife managers, SCS district conservationists, or Soil & Water Conservation District technicians for help in designing your shelterbelt. They will recommend tree species for each row, plus tree and row spacing, and how to prepare the site. Private nurseries in the farm belt will also help you plan a windbreak.

The DNR will cost-share new shelterbelts or efforts to enlarge, improve, or restore existing windbreaks. The DNR cost-shares the first eight rows by paying for 75 percent of the cost of the planting stock, but not to exceed $250 per row or $5.50 per tree. The DNR pays 100 percent of the costs for rows 9-16. DNR also compensates landowners for 100 percent of the planting stock for improving or enlarging shelterbelts, and 50 percent for any renovations or restorations to windbreaks.

Rick Erpelding



A shelterbelt with 10 to 16 rows of trees will cause snow to pile up on the windward side. Meanwhile, pheasants and other wildlife rest under the protective boughs of conifers on the lee side. A ten-row windbreak can be established on only six-tenths of an acre—a plot 135 x 200 feet. A more ideal planting would be a considerably larger, 16-row windbreak.

Pheasant stamps generate about $500,000 annually, of which about 90 percent goes toward upgrading habitat on private lands and in roadsides. In 1983, Minnesota became the third state to institute a Pheasant Stamp Program. It requires hunters to purchase a special $5 stamp along with their general hunting license. The DNR conducts an annual contest to select the winning design for each stamp. Left to right are the 1983-85 designs.

Chuck Wechsler

Wetland Restoration

Years ago, wetlands were considered wastelands—small pockets of water that hindered farming operations and stood in the way of new roads and developments. Unaware of the many values of wetlands, Minnesotans drained and filled over nine million acres of marshes and small lakes, most in the southern and western counties.

Today, most citizens view wetlands in a different light. They know that wetlands recharge groundwater supplies, slow runoff, filter out sediment and nutrients before they reach lakes and streams, and reduce downstream flooding. They also know the enormous value of wetlands to waterfowl and other wildlife. Pheasants nest in the grassy fringes of wetlands. In many areas, wetlands support large numbers of wintering pheasants.

About one-half million acres of wetlands are found on private lands in the pheasant range. To rescue these wetlands from drainage, the DNR inventoried the state's water basins, then classified about 263,000 acres statewide as protected wetlands.

Minnesota's protected wetlands include Types 3, 4, and 5 marshes that are 10 acres or larger. These semi-permanent or permanent wetlands often contain emergent vegetation such as cattails, bulrushes, or cane. Some may be 10 feet or deeper with aquatic vegetation growing along the fringes of open water.

In the past, landowners drained their wetlands to create more acres for growing crops. State and federal lawmakers recognized the public value of preserving wetlands by providing compensation to landowners who were not given permits to drain. In Minnesota, three programs provide payments to wetland owners.

Federal Water Bank. About 1600 landowners have enrolled some 87,000 acres in the federal Water Bank program. Administered by the ASCS, it offers annual payments of up to $55 per acre. Participating landowners sign a 10-year agreement not to drain, burn, fill, or use their wetlands for agricultural purposes.

The program benefits pheasants because for every acre of wetland, landowners also enroll from one to four acres of uplands. In fact, about 64,000 of Minnesota's Water Bank acres is uplands.

Unfortunately, the program has traditionally been plagued by a shortage of funds. The Water Bank Act authorized annual payments of up to $30 million, and there could be enough projects to meet that level of funding. But annual funding has yet to exceed $10 million. In some years, the ASCS has not had enough money to renew existing contracts, let alone to sign new agreements.

State Waterbank. A landowner who is denied a permit to drain a protected wetland may receive state Waterbank money to maintain his marshland. If drainage is feasible and practical, the DNR will compensate the landowner for keeping the wetland. Currently, about 3,000 acres are enrolled in state Waterbank agreements.

The program provides several compensation options including 10- and 20-year leases, conservation restrictions, perpetual easements, and fee purchases. The most common agreement is the 10-year lease.

Wetlands Tax Credit & Exemption. Semi-permanent and permanent wetlands smaller than 10 acres are not eligible for state Waterbank. But owners can still be reimbursed for maintaining these smaller basins under the Wetlands Tax Credit and Exemption Program. Protected wetlands are also eligible for tax credit, provided they are not enrolled in either Water Bank program.

Although some 350,000 wetland acres are eligible for tax credit and exemption, only about 127,000 acres were enrolled in 1983. The tax statements of wetland owners were lowered by nearly $500,000. The state's general fund then replaced the counties' revenues. A Wetlands Tax Credit agreement automatically renews each year unless the wetland is drained.

Food Plots

When heavy snowfalls or blizzards strike Minnesota, many people become concerned about pheasant starvation, even though it rarely occurs. Rather, it is the cumulative effects of poor cover and inadequate food supplies that cause severe population declines. Exposure, increased predation, and reduced nesting success the following Spring—all can affect pheasant numbers.

One way to help pheasants escape winter's icy grip is to establish corn or sorghum food plots next to good cover. Many ringnecks seek shelter in large wetlands or woody cover, usually near a reliable source of food. For this reason, food plots should be located adjacent to the larger wetlands with cattails, cane, or shrubby cover, or near shelterbelts with at least four rows of conifers. Sorghum not only provides food, it affords excellent protection from winter winds and snow. Food plots also help the birds to emerge from winter in better condition for producing their young in Spring.

Cost-share food plots for ringnecks are generally one- to two-acre block plantings, but may be larger if deer are common in the area. Landowners receive an amount equal to the cash cost for establishing the plot.

Feeder Cribs. In some cases, establishing a food plot is not practical. An effective alternative is a small feeder crib filled with ear or shell corn. The crib should be close to cover and positioned so the wind will sweep the corn free of snow.

Feeder cribs can be easily constructed out of woven wire mounted on a wood platform. They should be at least 39 inches high and 4 feet in diameter. If using shelled corn, make a double wrap of ½-inch hardware cloth. The holes are small enough to stop the corn from flowing out, yet large enough for pheasants to grab the kernels. The crib should also have a waterproof top.

Merlyn Wesloh

Plots of standing corn can provide a winter-long source of food for pheasants, deer, and even songbirds.

Positive Wildlife Practices

FARMERS can apply a number of positive agricultural practices that benefit soils and wildlife. Some, like conservation tillage, reflect a major new approach to farming. Other practices and projects require little time and effort, but nonetheless can have an important impact on soil resources and farmland wildlife.

Gary R. Zahm

Conservation Tillage

One of the most encouraging trends in recent years has been the steady growth of conservation tillage. This broad term includes a variety of farming techniques that leave a residue of vegetation to protect the soil from wind and water erosion.

Many of the nation's farmers, concerned by the nearly three billion tons of topsoil lost to erosion each year, are turning to conservation tillage practices that in most cases, reduce soil erosion by 50 to 90 percent. Only 30 million acres were in conservation tillage in 1972, but over 100 million in 1982.

Conservation tillage is also attracting farmers because it enables them to reap big savings in equipment, labor, and fuel. Some landowners have cut their tractor and machinery time in half. Others are getting by with fewer and smaller tractors and implements. One agronomist estimates that the nation's farmers could save 250,000 barrels of oil per day and almost 100 million barrels per year if they used conservation tillage practices.

So how do pheasants benefit? A lack of secure nesting cover severely limits reproduction over most of the pheasant range. Cultivation is so extensive that some nests invariably turn up on croplands, where they are seldom successful. But some tillage methods, such as *no-till,* do little to disturb nests in small grains. In states where farmers grow continuous crops of wheat, certain tillage practices could significantly increase pheasant production by providing added nesting cover.

Winter wheat can be very beneficial to wildlife. But few farmers grow winter wheat in Minnesota because our sub-zero winter temperatures push the frost deep into the ground, killing the roots. But the farmer who practices no-till, or *zero-till,* could grow winter wheat by leaving the stubble after harvest, then planting a new crop in the residue. In winter, the old stubble catches the snow, forming an insulating blanket that keeps the soil warm enough for the wheat roots to survive. In early winter and spring, pheasants can glean wheat seeds from the stubble.

The following spring, hens move into the 18-inch stubble to nest. At this time, the farmer may control weeds by spraying. In mid-summer, after harvesting the winter wheat, the farmer may plant corn, soybeans, or another crop directly into the stubble.

An increasingly popular conservation tillage method for row crops is *ridge planting,* or *till-planting.* In this form of tillage, the seeds are planted on narrow, elevated ridges. The farmer can grow corn or soybeans with a minimum of equipment and can plant his crops earlier, because the

ridges warm faster in spring. The method also requires smaller tractors and fewer trips over the field. Finally, it benefits pheasants and other wildlife by providing food and some cover in the crop residue during fall and winter. Ridge-tilled soybeans are especially attractive to pheasants, because winter winds keep the ridges free of snow.

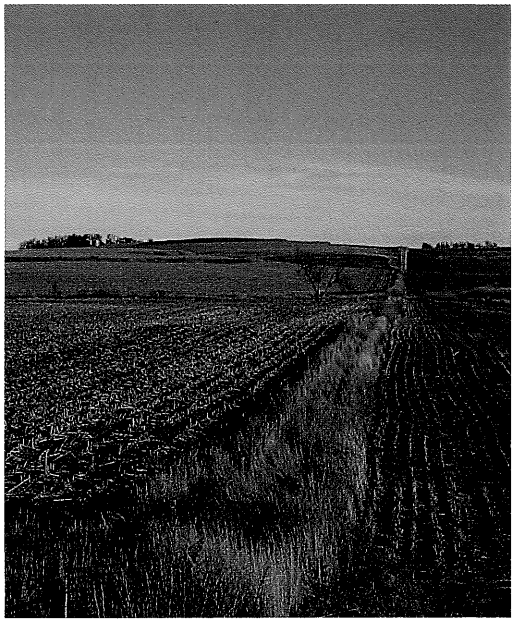
A possible drawback to conservation tillage is that it may require more applications of pesticides. These chemicals reduce the amount of cover and food available to pheasants, and they can kill the embryos of pheasant eggs and young chicks. But in the long run, farmers will have fewer weeds because the soil is turned over less, making it harder for weed seeds to gain a foothold. Moreover, today's farmers can choose from a wide array of safer, more effective, and highly-selective herbicides that can be applied at low rates.

Chuck Wechsler

John A. Scharf

Above: Chisel-plowed cornfields become a veritable cafeteria for pheasants. Left: Soybeans in this ridge-tilled field remain after harvest, providing food for pheasants.

John Ludwig



Chuck Wechsler

Farm shelterbelts (left) and grassy fencelines and terraces (right) control soil erosion while providing vital cover for wildlife.

Other Habitat Projects

Less ambitious, but still effective, are a variety of habitat practices and projects. Farming with wildlife in mind does not have to be an all or nothing choice. If we could provide habitat for just one more nesting hen on every Minnesota farm, we would increase our autumn harvest substantially.

- Delay or eliminate annual mowing in roadsides. If you do mow, an appropriate time is after August 1 which permits nesting pheasants to hatch their eggs, and before September 1, which allows vegetation to grow enough to attract nesting birds the next spring. Mowing a strip along the shoulder is seldom harmful to wildlife, because most nest in the ditch bottom or back slope. Roadside vegetation left undisturbed year-round is especially attractive to wildlife. However, it may require periodic mowing (once every three to five years) in late summer to maintain vegetation vigor and to control brush. Also, take care not to disturb roadside cover during the spring and summer nesting season by activities such as burning, "blanket" spraying, grazing, operating vehicles, or grain cropping (illegal in Minnesota roadsides).
- Delay cutting alfalfa for one week or longer where high-protein hay is not needed. Nesting pheasants have a much greater chance of hatching their young with just a one-week delay in the first cutting. Normal alfalfa cutting precedes the peak of the pheasant by about two weeks.
- Plant a greater variety of crops in rotation. A variety of crops in each section or farm will provide more of the basic needs of pheasants than a single crop, or monoculture. Some crops will be used as brood cover, others for food, and still others for nesting.
- Leave fences, waterways, and associated strips of cover between crop areas. Undisturbed grass strips provide nesting and brooding cover. The wider the strip, the better the nesting success. Using the strips as turning areas, or *headlands,* for machinery diminishes their value to pheasants.
- Fencing around livestock ponds can provide a small area of nesting cover and protection for hens to rear their broods. These grassy strips can also be used for cover in the fall, prior to severe winter weather.
- Leave two or more rows of cornstalks adequately spaced across the field when corn is used as harvested forage. Standing stalks reduce downwind drifting of snow into winter habitat, and shattered ears provide winter food.
- Avoid overgrazing your pastures. Many farmers are discovering that a pasture rotation system of cool-season and warm-season grasses allows them to rest their pastures, furnishing excellent forage for livestock, while providing good nesting and brooding cover for pheasants.
- Do not graze or mow newly-established woody cover or any odd areas.
- Instead of blanket mowing or spraying to control weeds, try spot spraying or spot mowing to control patches of noxious weeds.

Photo By Daniel J. Cox