

Ecology, Behavior and Conservation Status of Ring-Necked Pheasant (*Phasianus colchicus*): A Comprehensive Review



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Submission: February 16, 2024; Published: February 27, 2024

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Abstract

The common pheasant is a widespread species in its ecosystems. This review accumulates recent knowledge on this species' ecology, behavior, and conservation status, emphasizing adaptability, feeding habits, and social structures. It is for this reason that *Phasianus colchicus* harbors a varied conservation status across its wide distribution; it is under threat from a wide number of sources, spanning from habitat loss to hunting and changing environmental conditions. The following sections in this paper will explore these aspects as a contribution to the understanding of the ecological roles of *Phasianus colchicus* and a contribution to information that is useful for conservations aimed at mitigating threats to its survival.

Keywords: Ring Necked Pheasant; Ecology; Behavior; Conservation Status; Phasianus Colchicus

Introduction

Phasianus colchicus is the common pheasant, a species of significant interest in avian ecology, conservation biology, and biodiversity studies. *P. colchicus* is native to Asia and has a history of distribution, ranging from subtropical to temperate zones, and extends to diverse habitats such as agricultural lands and woodlands, through its introduction from Asia to many parts across the world for hunting. The behavior and ecology of an animal can be derived from the habitat it prefers to live in, what it feeds upon, and its social conduct. Moreover, the status of a game bird accrues to the attendant economic and cultural importance of a game bird that tends to stress the balance between human interests and conservation [Davis & Thompson, 2023]. This review hence assimilates the available research on ecology, behavior, and the conservation status of *Phasianus colchicus*, thereby identifying the complexities in its management and conservation challenges [Johnson & Kumar, 2021].

Taxonomy and Distribution

Pheasants are considered as the species of game birds and are placed in order Galiformes like the megapods (*Megapodiidae*), cracids (*Cracididae*), guinea fowl (*Numididae*), New World quails

(*Odontophoridae*), turkeys (*Meleagrididae*), grouse (*Tetraonidae*), partridges, Old World quails and pheasants (*Phasianidae*) [Delacour, 1977]. Ring-necked pheasant (*Phasianus colchicus*) is one of the significant representatives of the family Phasianidae, originally an Asian native. It is popularized in the world as an eminent game bird and is the most documented species of the order Galliformes around the World [1]. The common pheasant (*Phasianus colchicus*) is the state bird of South Dakota, and with good reason (economically). The state is well-known for its ring-necked pheasant hunting, which draws thousands of out-of-state hunters and generates millions of dollars in income. The genus's name is "Pheasant" and the species name is "*P. Colchicus*" [2].

There are two subfamilies of Ring Neck Pheasant, Phasianinae and Perdicinae. But in American states, there are three types of sub-family (*Tetraonidea*) grouse, (*Numididae*) Guinea fowl, and (*Mela agrididea*) Turkeys. The diversity study indicates that there are four groups of pheasants found in North America i.e. (1) the Ring-necked pheasant in Europe, North America, and Asia; (2) The white-winged pheasants of Afghanistan; (3) Green pheasants of Japan and (4) European pheasants of Eastern Europe [Sibley, 2003].

Pheasants have 181 species that are distributed throughout the World while 49 of these are found in Asia [2]. There are six pheasant species in Pakistan including the Cheer pheasant, Tragopan, Himalayan Monal pheasant, Kalij pheasant, Koklas pheasant, and Indian peafowl [3]. The Population of Himalayan pheasants has been classified into five sub-species groups based on morphological variation in male plumage Monal (*Lophophorus impeyanus*), Koklas (*Pucrasia macrolopha*), Western Horned Tragopan (*Tragopan melanocephalus*), White Crested kalij (*Lophura leucomalana*), and Cheer (*Catreus wallichii*) are indigenous species of Pakistan [4]. Cheer pheasant (*Catreus wallichii*) is a vulnerable species of the pheasant family due to

the increase in habitat loss, hunting in some areas, and small population size [Birdlife International, 2014].

The population of Western Horned Tragopan is also vulnerable and needs protection because they are considered the rarest species among all living pheasants as per the IUCN Red List. The population of Koklas, Kalij, and Monal is decreasing day by day and needs some protective measures. The major reason is habitat destruction in their native range therefore all species of pheasants are most vulnerable and threatened. Over 1/3 of their total population is considered at risk of extinction in their native range [IUCN, 2006] (Figure 1).

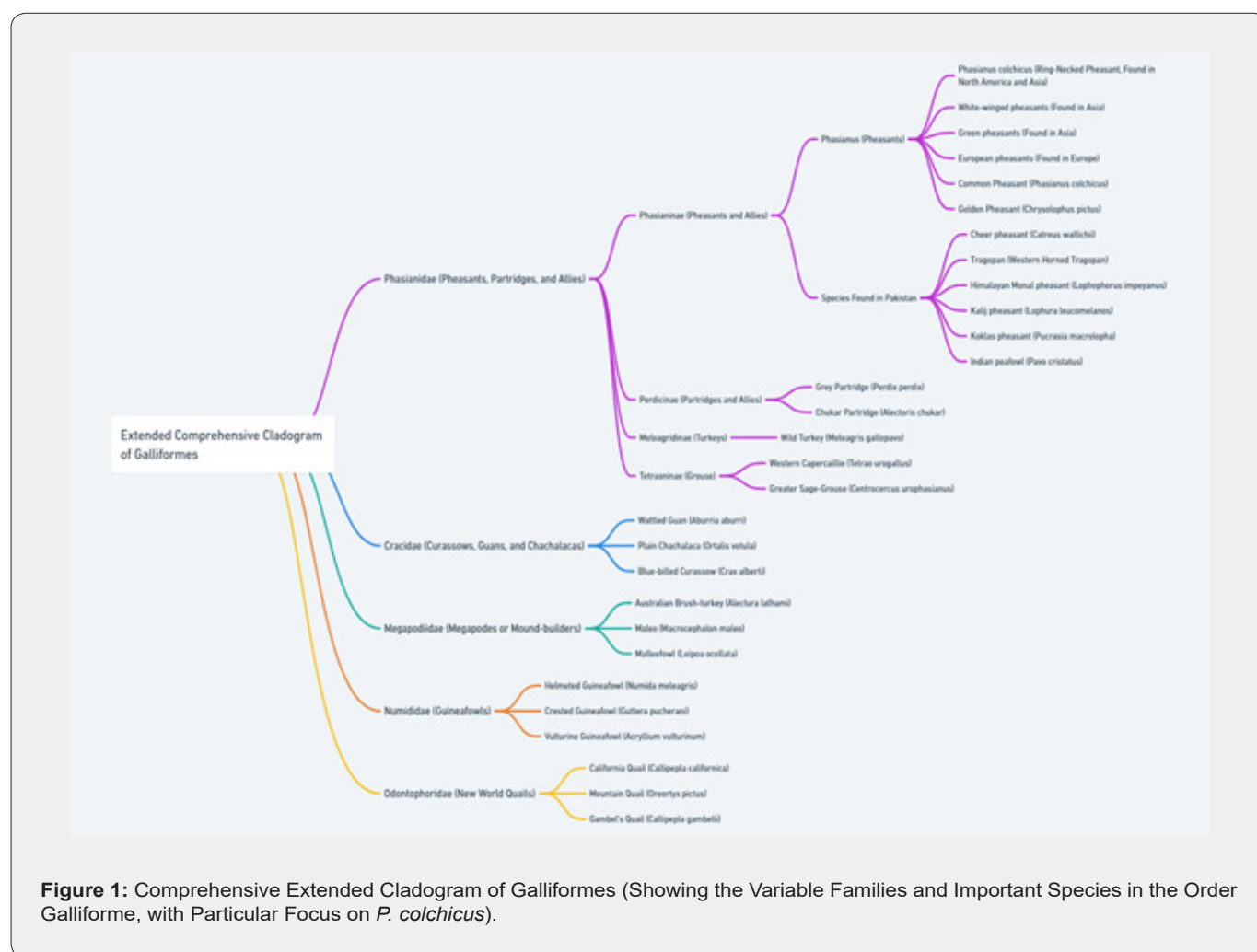


Figure 1: Comprehensive Extended Cladogram of Galliformes (Showing the Variable Families and Important Species in the Order Galliforme, with Particular Focus on *P. colchicus*).

Geographic Range

Phasianus colchicus is a non-migratory species from Eurasia. The native range ranges from the Caspian Sea east through central Asia to China, including Korea, Japan, and former Burma. It was introduced in Europe, North America, New Zealand, Australia,

and Hawaii. *Phasianus colchicus* populations have spread across mid-latitude agricultural lands in North America, from southern Canada to Utah, California to the New England states, and down to Virginia. It was first brought to the United States in 1857 and has since spread throughout the Midwest, Plains states, and parts of the West [1].

Ecology

Physical Appearance

Male ring-necked pheasants are large and gaudy with a small green head, pale bill, and red facial skin. The presence of a white collar around their thin neck makes them more distinctive among all other subspecies. It has a very long, thin, and pointed coppery tail with black bars on it and spurs on its legs. Golden plumage has white and black spots throughout (lab of Cornell Ornithology, 2011). There are two ear tufts behind the face, which makes them more alert (The Observer's Book of Birds, p.214). The weight of the male is 2.5-3 pounds. The tail length of the male is 18-26 inches. The ring-necked pheasant is dimorphic, and the males are adorned with ornaments, but females are simpler and light in weight. Males are heavier and have colorful brilliant plumage. The white ring is present around the neck in most of the males of this species. The spurs are present on the legs of pheasants and increase in size as they get older. Spurs are also present on the legs of juvenile pheasants having a length of about 3/8 inch. When male pheasants reach old age, the spurs also start to grow on the head of the pheasant. It is about an inch long on an old male [2].

Females are short-necked with small tails, absence of spurs on their legs, and have paler scaling on the upper parts. They also have Buffy brown or cinnamon heads and underparts with overall black spots and bars on their sides such as the head, neck, back, and wings, and the presence of thin black bars on their pointed tail. The body plumage of males may vary between gold, purple, brown, and white whereas females have drab brown feathers and are less showy. The average weight of a female is 2-2.5 pounds. Their tail length is 8-12 inches long. Both sexes can grow up to 10 weeks old but in females, 16 weeks of age is more frequent (lab of Cornell Ornithology, 2011).

Their chicks are slightly different. They show similarities in color with the hen during the early 2 months of their birth. After 8-10 weeks they show variations and start looking like young males. They mature in 2 months. As time passes, they attain full maturity in all features within the age of 4-5 months [5]. Newly hatched chicks are protected with fluffy buff-colored down with dark markings on the head and back about half an ounce. Their young ones can leave the nest after some hours of hatching. They can fight for a very short time even after the birth of 10 to 12 weeks [1] (Figure 2).



Figure 2: Male Ring-necked pheasant (Left side), Chicks (in the middle), female Ring-necked Pheasant (Right side).

Habitat Range and Preferences

Male and female common pheasants have greater home ranges during the breeding season than they do in the winter. During nesting season, females tend to have bigger home ranges than males. Some chickens' wintering home ranges were reported to be 63.7 hectares in Missouri and 49.7 hectares in Maryland, respectively. In Iowa, house ranges of 76 and 96 hectares were identified. Weather, land cover and usage, and human density all have the potential to influence these variances [6].

As regards habitat, the *Phasianus colchicus* is very adaptable, as the avian species prefers habitats that serve to provide the species with both a secure refuge away from predators and an abundance of food sources. In its native range, this species mostly

occurs at the edges of forests, and it also occurs in meadows and along the systems of the rivers. It is also adapted, in introduced territories, to show its ecological plasticity: introduced territories, to agricultural fields, orchards, and even urban fringes [Smith & Wang, 2022]. Their habitat is different in the winter and summer seasons. A self-sufficient pheasant population requires a portion of the site to be a form of everlasting gross cover for replication. Moreover, some populations may also need to be covered for protection from critical climate conditions. In their population in northern latitudes, such as North and South Dakota, the species need woody covers to provide thermal repose to save them from critical climate situations [7,8]. Increasing the daytime interval that initiates the multiplicative motion between pheasants (Figure 3).



Figure 3: Habitat of Ring-necked Pheasant.

Feeding Ecology

The diet of *Phasianus colchicus* is omnivorous; it changes with seasonal changes in resource availability. Pheasants generally live on agricultural land and chiefly depend on minor grains and seeds distributed with continuous grass cover [1,9]. It consists of a wide array of food items, including seeds, grains, fruits, insects, and small invertebrates. This dietary flexibility enables it to survive in different habitats and further reveals itself in local biodiversity through seed dispersal and predation on diverse species of insects and other small creatures [Johnson & Kumar, 2021]. The pheasant is a very flexible bird for the aspect of food behavior. In every season their food is different. But the basic foods always remain the same for the whole year.

They eat seeds, grains, nuts, grasses, roots, insects, and wild fruit but it depends on the area and seasonality availability of food [10]. The discarded grains are the normal food of pheasants but in the winter season, they can be accessed in the limited depth of snow [1]. For their quick growth, they must eat food that is rich in Proteins that can come from different sources like insects, slugs, spiders, and other vertebrates, up to six weeks of age. Seeds, plant materials, and some additional things are the most important food for old pheasant's growth. They almost usually feed on the ground, scraping for food with their feet or bills. Although open water is not required for *Phasianus colchicus*, many populations are found around bodies of water. In dry environments, common pheasants get their water from dew, insects, and succulent vegetation [1].

Ecological Role and Interaction

Phasianus colchicus is one of the most prey species responsible for the sustenance of several predators at the food web level, such as mammals and raptors. Its behavior affects the dynamics of the vegetation and the quality of the soil, contributing to the functioning of the ecosystem. The species interaction with the environment underlines the significance of biodiversity maintenance and ecosystem services [Johnson & Kumar, 2021]. They may also spread seeds through seed predation. They may harm bigger prairie chickens and gray partridges by parasitizing nests, competing for habitat, transmitting disease, and exhibiting aggressive behavior [11]. Common pheasants are often released into wooded areas for game shooting. One study in Britain investigated the impact of this approach. The researchers discovered that common pheasants had a neutral or favorable impact on vegetation and bird communities [12]

Behavior

Social Behavior

Common pheasants are social birds. In the autumn, they congregate in great numbers, sometimes in locations with food and shelter. Typically, the core home range is smaller in the winter than during the nesting season. Flocks established in winter can be mixed or single-sexed, with up to 50 pheasants. During the breeding season, a male is usually accompanied by a harem of females (Giudice & Ratti, 2001). Common pheasants spend most

of their time on the ground, and they roost in trees as well. They are fast runners that walk with a “strutting gait.” While feeding, they keep their tail horizontally; while running, they hold it at a 45° angle. Common pheasants are excellent fliers, capable of flushing nearly vertically during takeoff. Males frequently release a croaking call during takeoff. They flee when threatened [13]. Common pheasants dust bathe, which involves sweeping sand and dirt particles into their plumage with bill-raking, ground scratching, or wing shaking. This behavior helps to eliminate dead epidermal cells, excess oil, old feathers, and new feather sheaths [6].

Reproductive Behavior

They are polygamous meaning that the males maintain territories and strive to attract multiple females for mating. They do not form pair bonds. The males are adorned with bright colors, and they exhibit a complex display of courtship to win over the females. Males establish mating or crowing territories throughout the early spring (mid-March to early June) [1]. These territories are comparable to other male territories and may not have clear boundaries. Females, on the other hand, do not exhibit territorial behavior. Within their breeding harem, they may exhibit a dominance hierarchy. These harems endure throughout the courting and nesting season and may contain 2 to 18 females. Each female normally has a seasonally monogamous connection with a single territorial male [13].

Males establish a harem in early spring by crowing and flapping their wings. Males employ a distinctive, loud korrk-kok call to maintain their territory. A virtually inaudible wing flap

may precede this, followed by a brief but powerful wing-whirring by the male. Physical encounters between competing males can include flying at each other breast-to-breast, biting wattles, or high leaps with kicks to the other’s bill. Males who establish breeding territories earlier in the season are more dominant than males who do so later [14]. Females chose their mates based on a variety of variables. Female common pheasants prefer dominant males who can, for example, provide security.

According to studies, females prefer long tails in males, and the length of ear tufts and the presence of black spots on the wattle also influence female preference. The overall brightness of a male’s plumage is irrelevant, maybe because brightness is unrelated to testosterone levels or dominating behaviors in male common pheasants [15]. Territorial disputes are common and may involve vocalization or actual contact [Davis & Thompson, 2023]. The study of pens tells that the hen will continue to lay eggs for about three weeks based on single mating. One male can do mating with about 50 females in one season without the loss of fertility. They breed once a year [13].

Males use various courtship displays, which evoke varying responses from females. According to one study, feeding rituals in males attracted female common pheasants, whereas lateral display wooing activities in males aroused females for copulation. In a lateral display, the male approaches the female by slowly passing in a semicircle in front of her, his head down, the nearer wing drooped, and his wattle erect. This lateral display frequently precedes copulation; however, later in the season, a male may just pursue and attempt to mount a female [1].



Figure 4: Nest Formation.

Nesting Behavior

Nesting starts just before females start to lay eggs. Peak incubation occurs in May and peak hatching starts in mid-June. Incubation lasts roughly 23 days after the final egg is laid. In Southern Iowa, the pheasant starts nesting early in March, but the egg laying period starts from mid to late April. The nesting and incubation period only takes place by hens, and they construct the nest. The nest is a small depression lined with erect grass and vegetative material like grasses and weeds, which is laid on the ground in dense cover. Its length should be at least about 8-10 inches tall. The female lays between 7 and 14 eggs, which she alone incubates. When two or more chickens lay their eggs in the same nest, they produce larger clutches. When the eggs hatch, the young leave the nest nearly quickly, with the mother caring for them. While the female cares for the young, they feed themselves [1,13] (Figure 4).

Lifespan

Chick survival is influenced by hatch date, birth mass, and habitat type. Many young people do not live beyond autumn. Adult females have an annual survival rate of 21 to 46%, compared to only 7% for men. In some regions, the lower male survival rate can be attributed to human hunting of male common pheasants. Almost all wild birds perish by the age of three. Predation, agricultural operations, pesticide and toxin exposure, and motor vehicle accidents all contribute to adult death rates [1,16].

Seasonal Behaviors

The behavior of *Phasianus colchicus* is distinctly modified with the coming of seasons. Migration does not take place in this species frequently; however, movement in it is known to happen due to food availability and environmental conditions. As part of wintering behavior, *Phasianus colchicus* forms loose flocks for efficient foraging and protection against predators [Davis & Thompson, 2023]. Migratory movements are evident in northern populations where cold weather causes birds to seek warmer climates. Males leave first during group dispersal in early spring, which is progressive rather than abrupt [Giudice & Ratti, 2001].

Communication

Vocalizations are quite important concerning the *Phasianus colchicus*, believed to be utilized for lots of communicative purposes including the declaration of some sort of territory and the starting of breeding. The sound repertoire encompasses crow, cackle, and alarm calls; they all mean the corresponding type of information to conspecifics and social influence. [Davis & Thompson, 2023]. The male pheasants produce sounds like "COOKS. They made harsh and loud croaking sounds when alarmed. This crowing sound is often used when males are establishing their territory. In agricultural settings, males can be heard crowing at twilight, dawn, and during mating season. This call is extremely close to the recognized rooster call and has a range of up to a mile. Female calls are more delicate and less audible [1, 14].

Economic Importance

Pheasants are important for many reasons such as recreational, aesthetic, and economic purposes. Pheasant production and shooting become the most productive business in developing countries [17]. Pheasants are useful for humans for many purposes throughout the World. Through their production and management, sustainable profits can be achieved by economic inducements [17]. Pheasants have two important traits which make them more meaningful. Firstly, they are the most prominent species in nature and secondly, they are eye-catching and widely act as a food source [2]. They are the source of social improvement [Long, 1981]. Some of its species are used to control ecosystem health [18]. In well-developed countries, the pheasant is not only a game bird, but also a very productive bird. This type of industry is essential for the management and preservation of countryside zones [Grahm et al., 1993]. The ringneck pheasant has become the highly iconic symbol of the cultivated Midwest landscapes, and the male pheasant proves that an excellent quarry for sportsmen with its rapid running capacity and volatile flight [1].

Economic Importance for Humans

The most significant benefit of *Phasianus colchicus* to humans is as an upland game bird [15].

Status

Abundant and pervasive. Although populations in their homelands are declining, populations in North America are thriving, not likely due in part to regular bird stocking in places where hunting is popular. The Ring-necked Pheasant is a "Least Concern" species, according to the IUCN [1].

Threats to population viability

Species extinction is a process of nature, but such a process is currently speeded by several factors, and, therefore, many species of birds are on the brink of disappearance at present [19]. The decline in bird populations has resulted from habitat loss, illegal egg collection, poaching, hybridization with other species, hunting, and a spectrum of human disturbances. Such activities not only decrease the number of individuals in the wild but also hurt the reproductive success, fertility, and survival of the offspring [20].

Habitat Loss

Several reasons cause threats to this species population. Of all of them, one major reason is the destruction of their habitat in their native range for different purposes like the removal of trees for different purposes production of hardwood, agricultural invasion, excessive foraging of animals, etc. Pheasants are mainly dependent on forests for their habitat so the removal of valuable trees in large numbers causes deforestation which in turn affects the population of pheasant species. This commonly occurs in tropical forests where the removal of antique trees for commercial purposes occurs [17].

Hunting

Another major reason is hunting on a large scale which hurts the pheasant's population. Adult common pheasants can be preyed on either on the ground or in flight. Almost all members of the order Galliformes are harvested on a large scale for different purposes like food, game trade, etc. The reason behind this is that they are Game birds, so they attract the attention of hunters mainly. The quantitative estimation of hunting is tough as it is an illegal activity. But this has a major negative impact on the pheasant population [17]. Hunting of this species occurs for many reasons including, mainly to meet the nutritional requirements as they are a good source of protein. Another reason is that they are easy to capture and shoot and their beautiful feathers catch the attraction of hunters [21] [IUCN, 2006]. In some regions, human game hunting poses a considerable predation risk to male pheasants. Common pheasants are especially vulnerable to predation while nesting [1].

Human's attraction toward pheasants has always been high due to their stunning feathers, which enable them to catch or shoot easily and enrich in protein [IUCN, 1998]. Hunters are attracted to them due to their healthy meat having low fat, enriched in necessary amino acids and fatty acids content than broilers, including geese and ducks [22]. Approximately all the species of pheasants are exploited for food sources largely for meat and egg requirements in natural ways throughout the world because they are easy to capture and a good source of protein. The copper pheasant is the species which has at threat of hunting by humans because this species is raised under custody to arrange pheasants for games [1].

Harvesting

Along with hunting many other factors like harvesting have adversely negative impacts on the pheasant population because they are mainly forage on the ground usually in the morning and evening, build nests on the ground, and found on the grounds for their different activities [17]. Humans also have some other kinds of activities that annoy their population. Humans produce medicines from fungi and different kinds of herbs in the spring season. So, this is the major agitation in the population of pheasants [Katocrakhah et al. 1997]. Advancement in the tourism industry is another main disturbing factor of this kind. Hunting of the pheasant on the ground is the major cause of the decrease in their population, and damage to their natural habitat is another major cause, as poor nourishing situations and increasing of hunters [Hoodles et al. 2001].

Conservation Strategies

There are conservation actions that need to be set in place for *Phasianus colchicus*, which include habitat restoration, legal protection, and monitoring of the population. This can be through the creation of designated areas for these species, hunting sustainably, or the creation of agri-environment schemes.

There must exist aspects like public awareness and community involvement for such to be facilitated, which further proves the need for education and engagement [Green & Harper, 2020]. Also, captive breeding is considered an effective solution to conserve endangered species, but it has many risks such as loss of genetic diversity and limited opportunities for these species to survive in their natural habitats. To surmount the above challenges, assisted reproductive technologies such as semen cryopreservation and artificial insemination (AI) have come up as invaluable tools.

These techniques are vital for preserving genetic diversity and the transfer of useful genes to the future for their availability to rescue and multiply the rare types and species that may not be bred in captivity [23]. The oldest method used today dates to the work in developing glycerol as a cryoprotectant some fifty years ago [Hold & Pickard, 1999]. These findings have been well-documented in domesticated avian species like the chicken [Donoghue, 1999], turkey [24], and duck [25]. These conservation techniques are thus very necessary to be effectively applied to save their species because of the decreasing population of the ring-necked pheasant.

Conclusion

Effective management of *P. colchicus* for proper conservation would have to take care of most of the challenges the bird faces. Future research must focus on the effects of climate change, habitat connectivity, and genetic diversity on population dynamics. It is also through a collaboration of conservationists, policymakers, and local communities that can help effectively in the identification, development, and implementation of the needed sustainable solutions [Green & Harper, 2020]. The literature review of the ecology, behavior, and conservation challenges facing the species has highlighted the need for informed, collaborative approaches in its management [26,27]. As anthropogenic activity continues to change natural habitats, it becomes imperative that the degree of resiliency in species, as exemplified by *Phasianus colchicus*, be understood for the betterment of biodiversity and the health of ecosystems [Johnson & Kumar, 2021; Smith & Wang, 2022].

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DOI: [10.19080/AAPS.2024.02.555593](https://doi.org/10.19080/AAPS.2024.02.555593)

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