GROUSE NEWS

Newsletter of the Grouse Group *of the*
IUCN-SSC Galliformes Specialist Group

Galliformes Specialist Group

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Chair Grouse Group within the IUCN-SSC Galliformes Specialist Group

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From the Editor

From the start with issue 1 in March 1991 Grouse News was printed and sent to members of Grouse Specialist Group by mail as a paper version. If I am not wrong, all had to pay a small amount, £5/year, to receive it. We do have all the paper versions from issue 1 to 23 as PDF files. The first electronic issue was issue 24 in December 2002. When Grouse News was published electronically, a new website of the GSG was launched. The Webmaster was Michèle Loneux and she got technical support from Phil McGowan of WPA and The Game Conservancy Trust. Both, the new Grouse News and Website made the communication and exchange within the grouse network much easier. And with the start of electronic age, number of subscribers has increased to very high numbers. In total we now have more than 560 on the mailing list. For this reason it has been necessary to split the mailing list in 3 groups. Even then it seems that for some the number is too high to receive, the email is returned. Also some are returned because of security reasons. And some forget to report new email address.

In this issue you will find information on the status of the grouse species in Estonia and the status of the smaller white-tailed ptarmigan in USA. The situation of the Attwater's prairie-chicken is published. An article on the fluctuations and trends in tetraonid populations of the "Bryansky Les" Nature Reserve (SW Russia) is published. Also two articles on lesser prairie-chicken is found, one dealing with evaluation of fence tags in Kansas and Colorado and one with longevity of the lesser prairie-chicken. A new book about European breeding birds, the European Breeding Bird Atlas 2: Distribution, Abundance and Change is mentioned. The list of recent grouse literature is also this time long and as usual made in a perfect way by Don Wolfe. And the presentation of stamps with grouse is continued.

And again one of our good colleagues has passed away. Alexander Vladimirovich Andreev (1948-2020) from Russia died on December 7, 2020. He was born in 1948 in Leningrad.

The 34th Prairie Grouse Technical Council Meeting, which was scheduled for October 2021 has also been postponed to 2022. To follow developments for the rescheduled meeting or to download proceedings from all previous PGTC meetings: https://www.prairiegrousecouncil.org/. We will also remind you that the 15th International Grouse Symposium planned to be at University of Białystok (UoB), Poland this autumn is postponed till 2022 because of the uncertainty about covid-19.

It has hard to get people to write for this issue. We really need you to contribute to keep Grouse News going. It is not necessary to have your project finished before you write. Report from ongoing projects is also of interest and may give important comments on what you are doing. We would also welcome thesis and dissertation abstracts, as well as news about conservation of grouse throughout the world.

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From the Chair

More than a year ago, the COVID-19 pandemic dramatically changed our lives. There is no doubt that many of us have been impacted personally, from the tragedy of lost lives to the inconvenience of cancelled meetings and research opportunities.

In the grouse world that I live in, Zoom and Teams have become the two digital platforms where I spend much of my time. Between grouse and department meetings, I spend more time on the computer than I ever did. Frankly, I'm getting tired of seeing my face on the computer screen. Fortunately, there is still time for early morning grouse work. Because of the travel restrictions I had in spring 2020, my subsequent outdoor work has been especially enjoyable.

Most of us have adapted to the changes. Fieldtrips which were cancelled last year have happened this year, but with precautions. We have avoided car-pooling to reduce transmission risk. We have done our best to maintain personal space in the field. We wash hands and wear masks. Fieldwork has progressed in similar ways. In fact, because of the travel restrictions in 2020, more fieldwork has been conducted in 2021 than would be considered normal. We have even participated in outdoor classrooms with children.

Hopefully vaccine availability will increase throughout the world and we will all get back to something that resembles normal. Unfortunately, it will be too late for most of the major wildlife meetings scheduled for 2021 including the grouse meetings. The biennial Sage- and Columbian Sharp-tailed Grouse Workshop was originally scheduled for Oregon, USA in June 2020. After postponing it for a year, the organizers decided to make the meeting virtual in June 2021. Approximately 50 talks are currently scheduled. Similarly, both the International Grouse Symposium in Poland and the Prairie Grouse Technical Council conference in Montana, USA were scheduled for autumn 2021. Both conferences are being rescheduled for autumn 2022.

I hope wherever you live you are able to stay safe and healthy.

International Grouse Group member Leslie Robb holding a male greater sage-grouse.

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NEWS FROM GALLIFORMES SG

Galliformes Specialist Group Co-Chair statement

Rahul Kaul takes over for Simon Dowell as GSG Co-Chair
Please read the following statement from Simon. I have known Simon for more than 30 years and he is someone who always goes above and beyond the call of duty in everything he does. This pandemic has been particularly hard on the zoo community and Simon is a key person with enormous responsibility at the Chester Zoo in the UK. Rahul Kaul is the new GSG co-chair after Simon Dowell.

John Carroll, co-chair of IUCN-SSC Galliformes Specialist Group
School of Natural Resources, University of Nebraska, Lincoln, USA, galliformesguy@gmail.com.

Simon Dowell leaves as Co-chair of GSG
It has been my very great privilege to serve you as Co-Chair for the Galliformes Specialist Group (GSG) for these last four years, and a pleasure to work with my co-Chair, John Carroll, on leading the group. During this time we have made progress on a number of fronts, including forging greater links between the ex situ and in situ, improving communications for the group through the website and facebook site and advising BirdLife, CITES and others on changes to the threat status of several of the species for which we are responsible. I am also delighted to have been able to play a part in developing the conservation plan for perhaps our most threatened extant species, the Vietnam (formerly Edwards') Pheasant. Thanks to Viet Nature, WPA and a number of Zoo partners we now have an active Species Recovery Plan for this species that is working towards reinstating populations in the wild in Vietnam through an ambitious population management and anticipated reintroduction programme.

Sadly, due to a number of other pressures, some exacerbated by the current pandemic crisis, I am no longer able to devote the time to the Co-Chair role that it requires and so I have decided to step down from this role at the end of this IUCN quadrennium. Despite this I will continue to represent the GSG and play an active role in the Vietnam Pheasant Species Recovery Team and I will, of course, remain a committed member of the GSG.

I am delighted to be handing over my Co-Chair responsibilities to Rahul Kaul, who is a lifelong friend and Galliformes colleague and who brings a wealth of experience and expertise to the role. I know that Rahul will do an excellent job and I look forward to supporting him. I would also like to thank John Carroll for his support and all the work he has done for the group. John continues to work tirelessly to advance the GSG and I really appreciate his positive and pragmatic approach - I could not have had a better Co-Chair. It is reassuring to leave the GSG in their capable hands and I look forward to its continued success.

December 2020
Simon Dowell, Chester Zoo (UK), s.dowell@chesterzoo.org.

New GSG co-chair after Simon Dowell.
Dr Rahul Kaul comes with over 30 years of experience in wildlife research and conservation including a stint as the co-chair of the then IUCN/SSC Pheasant Specialist Group with Dr Peter Garson.

Dr Kaul obtained his PhD degree on the Ecology of the Cheer Pheasant and went on to run the South Asia Field Office of the World Pheasant Association from Delhi for a period of 13 years. During the course of his tenure, Dr Kaul initiated several research, training and conservation programmes in the south Asia Region which gave rise to a large and qualified work force researching various aspects of Galliformes conservation. Dr Kaul then moved on to the Wildlife Trust of India where he is now the Chief of Conservation and Vice President and is deeply involved in species recovery. He is also a member of the Scientific Advisory Committee of the World Pheasant Association.

Rahul Kaul, co-chair of IUCN-SSC Galliformes Specialist Group.
rahul@wti.org.in.

NEWS FROM GROUSE GROUP

CONSERVATION NEWS

Grouse in Estonia

Jaanus Elts

Estonia is situated in Northern Europe. It is bordered to the north by the Gulf of Finland across from Finland, to the west by the Baltic Sea across from Sweden, to the south by Latvia, and to the east by Lake Peipus and Russia. The territory of Estonia consists of the mainland and of 2,222 islands on the eastern coast of the Baltic Sea, covering a total area of 45,227 km^2, and is influenced by a humid continental climate. The climate in Estonia can be called temperate and mild. About half of the country is forested - in total 2.3 million hectares. Estonian forests feature the characteristics of Scandinavian forests with dominance of pine (32%), spruce (19%) and birch (30%) by area. Under protection are 0.57 million ha (24.6%) of which are strictly protected 0.3 million ha (13.2%).

There are four breeding species of grouse in Estonia. At present, only the hazel grouse is in a list of huntable species, also being not very popular quarry species – only a few tens of birds are shot annually. All other grouse species are protected. The capercaillie was a hunting bird until the 1970s and still is shown in the coat of arms of Estonian hunting association.

Species accounts

The numbers and trends of grouse populations and distribution are given in Table 1.

Hazel grouse

The most common gallinaceous bird in Estonia, breeds uniformly and numerously throughout the mainland. In our largest island Saaremaa it became extinct by the second half of the 19th century. The hazel grouse occurs in forest habitats of various types. It prefers moist mixed forests rich in shrub layer of spruce. The first notes on the decrease of the hazel grouse date back to the late 19th century (Koch 1911). Though some authors stated a restriction of the range and numbers during the first half of the 20th century, data from 1929-1935 and all-Estonian censuses carried out in 1954-1974 show that the total population has remained stable for decades. At the same time, local populations may have catastrophically decreased (Leibak et al 1994).

Willow grouse

At the end of the 18th century willow grouse was a common species throughout Estonia including the Western Archipelago. The first reference to the decline of the willow grouse in Estonia date from the 1870s and in the late 19th century, the decrease in numbers was already obvious (Russov 1923). In the early 20th century, its numbers were higher in northern Estonia and lower in the southern part of the country. The willow grouse disappeared from many small mires at that time. In the mid-20th century, the species breeds only in large bogs in the mainland. Most profound restriction took place in 1980s: by 1987 it only bred in 30% of the sites inhabited in 1977-1980, and was entirely extinct on western islands.

Black grouse

The black grouse occurs uniformly all over Estonia including the Western Archipelago, though it has become very rare in Hiiumaa. Though a decrease in the numbers was first documented already in the second half of the 19th century, it becomes more remarkable in the 1960s, probably due to changes in habitat favourable for the species.

Capercaillie

The capercaillie breeds patchily over the Estonian mainland. Its occurrence is closely linked with extensive forest areas. 70% of lek sites are situated in eastern and in intermediate Estonia. The population of Hiiumaa was estimated at 200 birds in the early 20th century (Loudon 1909). At nowadays, the species is absent from other maritime islands including Saaremaa where it became extinct by the mid-19th century (Kumari 1954). 94% of Capercaillie lekking sites are included in protected areas for over 10 years already. Despite of conservation efforts there are still no signs of a recovering population. Consequently, protection of lekking sites alone does not help to reach a viable and recovering capercaillie population.

Table 1. Population size, long and short trend and change in distribution of Estonian grouses over 40 year period.

Species	No. of breeding pairs[1]	Trend[1]		No. of occupied atlas squares (10*10km)[2]	Change in distribution[2], %
		1980-2017	2006-2017		
Tetrastes bonasia	20000-25000	- >50%	- >20%	396/369	-7
Lagopus lagopus	10-20	- >50%	- >20%	93/14	-85
Tetrao tetrix	4000-5000	- >50%	- >20%	475/359	-24
Tetrao urogallus	1300-1600	- >20%	- >20%	237/166	-30

[1] – Elts et al 2019
[2] - Change in distribution is calculated as difference in % between two breeding bird atlases: 1976-1982 and 2003-2009 (Elts et al 2018).

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News Release

Endangered Species Act Protections for Southern White-Tailed Ptarmigan Found to be Not Warranted

North America's Smallest Grouse Projected to Be Resilient

For Immediate Release
December 2, 2020

Southern white-tailed ptarmigan (*Lagopus leucurus altipetens*).

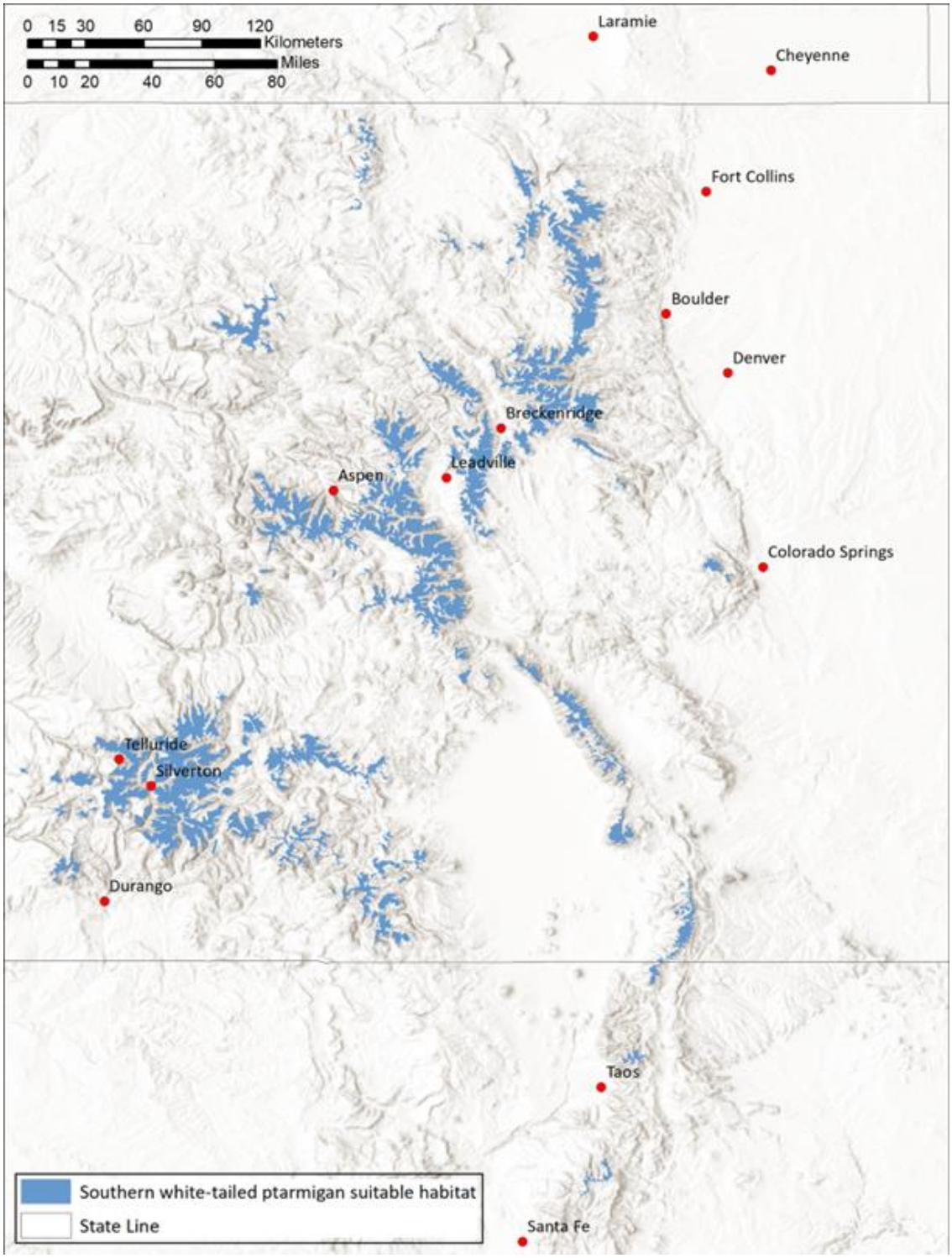
DENVER – Following a review of the best available science, the U.S. Fish and Wildlife Service (Service) is publishing a not-warranted for listing under the Endangered Species Act (ESA) finding for the southern white-tailed ptarmigan. The bird is the smallest grouse in North America, living exclusively in mountainous, alpine habitats of Colorado and a small portion of northern New Mexico.

This finding is based on a peer-reviewed Species Status Assessment (SSA) that follows a 2012 substantial finding on a petition to list the subspecies of grouse under the ESA. After evaluating the future viability of the bird under a variety of climate projections, authors of the SSA found that populations of this grouse will likely remain present and resilient across most of its range, without danger of extinction. A separate determination and announcement will be made for the Mt. Rainer white-tailed ptarmigan subspecies.

This subspecies is one of the few animals that is well adapted to live in the harsh alpine environment year round. Cool temperatures, rocky areas, soft snow and the presence of willows, the bird's primary food source, characterize the alpine habitats of the southern white-tailed ptarmigan. A complete change in plumage helps these birds camouflage themselves across the seasons, changing from speckled-rock colors in the summer to completely white in the winter. Heavily feathered feet support the ptarmigan, much like snowshoes, allowing it to walk on top of snow, rather than fly, to conserve energy.

Nearly all of the southern white-tailed ptarmigan's suitable habitat occurs within federally managed lands, 55% of which occurs within designated wilderness areas. 85% of the total potentially

suitable habitat occurs on lands managed by the U.S. Forest Service. The National Park Service supports 5% of the predicted range, with suitable habitats in Rocky Mountain National Park and Great Sand Dunes National Park.
https://www.fws.gov/mountain-prairie/pressrel/2020/12022020-Endangered-Species-Act-Protections-Southern-White-Tailed-Ptarmigan-Found-Not-Warranted.php.



Range for the southern white-tailed ptarmigan in Colorado and New Mexico, USA (USFWS).

A Remarkable Return

The Attwater's prairie-chicken is bouncing back.

U.S. Fish and Wildlife Service

After decades of protection and conservation efforts, Texas' critically endangered Attwater's prairie-chicken population is at its highest since 1993. Officials with the U.S. Fish and Wildlife Service and The Nature Conservancy in Texas estimate the current population is at least 178 birds, with 89 males counted during the 2021 spring survey at the Service's Attwater Prairie Chicken National Wildlife Refuge and on private ranch lands participating in grassland management activities as part of the Conservancy's Refugio-Goliad Prairie Project.

A male Attwater's prairie-chicken by John Magera/USFWS

While populations remain at extreme risk, this year's count demonstrates a remarkable turnaround from near extinction in the wild just a few years ago.

The Attwater's prairie-chicken, which is actually a member of the grouse family, was once extremely common in coastal grasslands of Texas and southwest Louisiana. Historic writings speak of Attwater's prairie-chickens being so numerous that they were relied upon to provide fresh meat for cowboys working cattle distant from ranch headquarters.

Because of habitat loss due to woody species invasion and conversion to agriculture, cities and non-native pasture, the Attwater's prairie-chicken disappeared from Louisiana early in the 20th century, and by mid-century were struggling to hang on in Texas. In 1967, the Attwater's prairie-chicken became a member of the "class of '67" — among the first on the U.S. list of endangered species.

For the full text see https://usfws.medium.com/a-remarkable-return-a9a6c1026153. The full text at U.S. Fish and Wildlife Service webpage is written by Dr. Mike Morrow, U.S. Fish and Wildlife Service.

RESEARCH REPORTS

Fluctuations and trends in tetraonid populations of the "Bryansky Les" Nature Reserve (SW Russia)

Serguei Kossenko and Julia Medvedko

The "Bryansky Les" State Nature Reserve (hereafter the Reserve) with an area of 12280 ha is located in the southeast of the Bryansk Oblast (administrative region in the European southwest of Russia) at the altitudes between 135 m and 189 m a.s.l. in the middle of a large forest tract known as the Nerussa-Desna woodland (Figure 1). Forests cover about 80% of the area. Of these, pine forests have the largest proportion. Also birch, oak, spruce, lime, black alder, aspen and ash forests, as well as swamps and meadows are present here (Kossenko & Medvedko 2019).

Three species of tetraonid birds occur in the Reserve: capercaillie (*Tetrao urogallus*), black grouse (*Lyrurus tetrix*) and hazel grouse (*Tetrastes bonasia*). Capercaillie and hazel grouse are here at the southern edge of their range in the European part of Russia (Potapov 1987). All three species are widely considered as the priority monitoring objects in Russia. The reasons for this include their unfavorable population trends that is applicable even to the specially protected natural areas with no forest exploitation (Kurhinen et al. 2018). Here we consider long-term fluctuations and trends in the tetraonid populations of the nature reserve where forest management is minimal (only maintenance of roads and pathways through the forest as well as fire prevention).

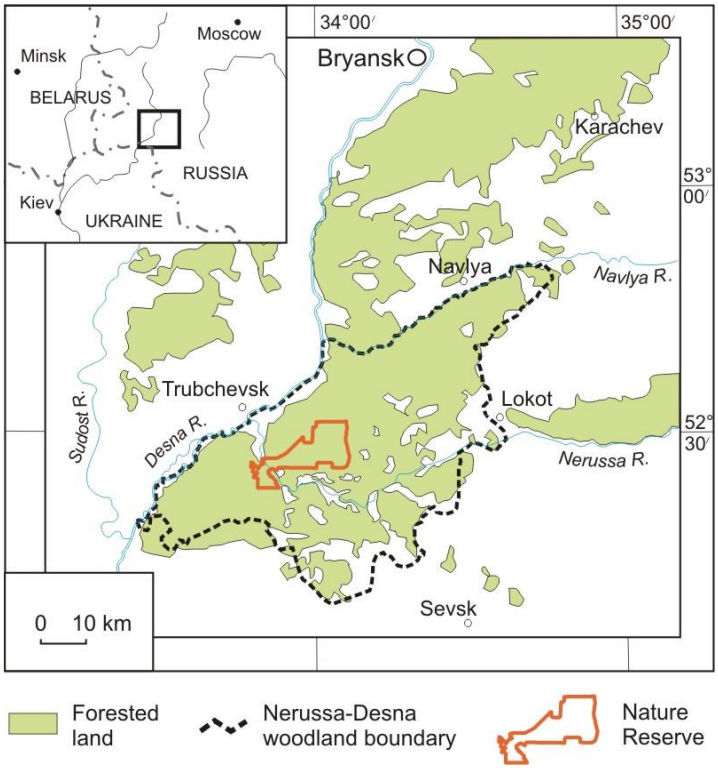


Figure 1. Geographical location of the "Bryansky Les" State Nature Reserve.

Materials and methods

The annual post-breeding census of tetraonid population in the Reserve is carried out in autumn, usually in mid-October, when leaves fall halfway from trees and shrubs that promotes detection of birds. All tetraonid birds are recorded on permanent routes within a belt of predetermined fixed width to assess the population density of the species in different habitats and then calculate their total population based on the area of habitat in the Reserve (Kossenko 2017). Since 2004, the number of routes (30) and their total length (245 km) have been constant that enables us to directly use the number of counted birds for analysis of fluctuations and trends, without resorting to the total abundance estimates based on the extrapolation of population densities. The advantage of this approach is also that the sample of data for analysis is not limited to the birds recorded within the fixed belt and includes distant records. Totally, from 2004 to 2020, 183 individuals of capercaillie, 93 – black grouse and 442 – hazel grouse were recorded on the routes.

Standard error of the mean (SE) and coefficient of variation (CV) were used as measures of the population fluctuation amplitudes. Population trends were analyzed using models of simple linear regression. The strength and significance of the trends were evaluated by the square of correlation

coefficient R2 and the Fischer F-criterion. Statistical calculations were performed using STATISTICA software package.

Results

Capercaillie

In total, from 4 to 30 individuals of capercaillie were recorded on the routes in various years (on average, 10.8 ± 2.6 individuals). These figures correspond to the relative population density from 1.6 to 12.3 individuals per 100 km (on average, 4.4 ± 1.1 ind./100 km). The population density of capercaillie undergoes significant annual fluctuations (coefficient of variation 60.9%). Until 2017, there was a close to significant trend towards a population decrease (regression coefficient $a = -0.63$, $R^2 = 0.29$, $F_{(1,11)} = 4.52$, $P = 0.057$). However, in 2017 and 2019 there were pronounced surges of the capercaillie population density (4 to 5 times higher than in previous year), after which it returned to its former low level (Figure 2). The high population density values during the surges were also confirmed by the high frequency of capercaillie records beyond the routes, that is, these extraordinary figures are not wrong. The reason for some recovery of the capercaillie population may be associated with a drastic reduction in the numbers of wild boar (*Sus scrofa*) in the Reserve and surrounding areas since 2015 (Kossenko 2017). Wild boar is known as a predator of ground-nesting birds, their eggs and chicks including capercaillie (Potapov 1987; Romanov 1988).

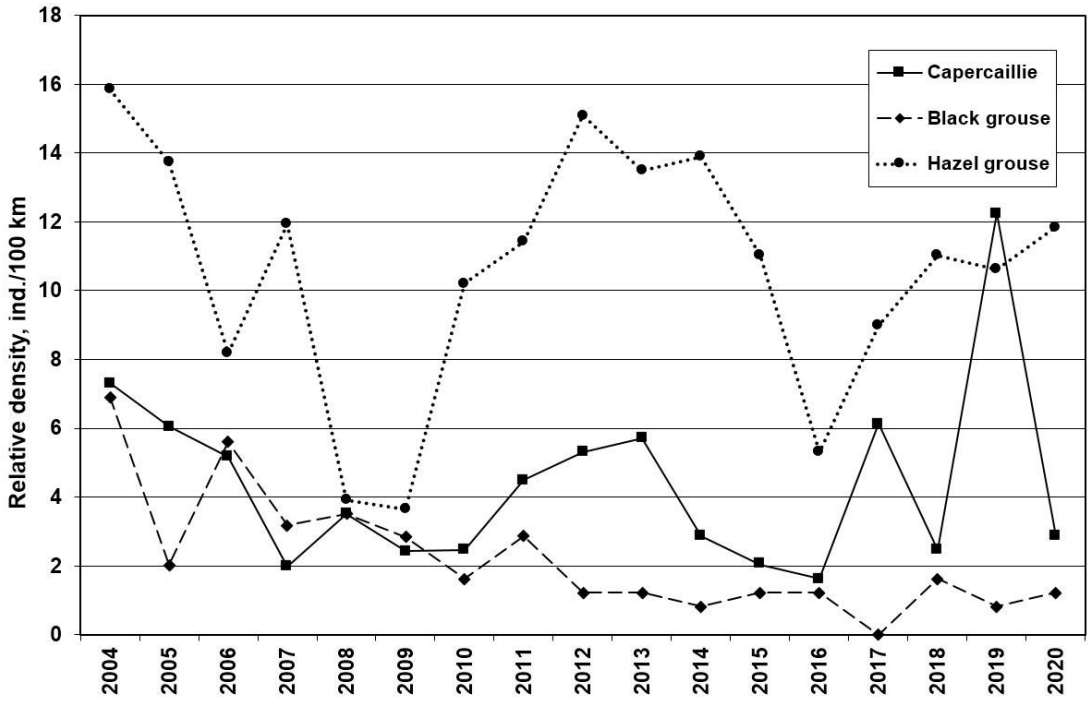


Figure 2. Relative population density (number of individuals per 100 km) of capercaillie, black grouse and hazel grouse in the "Bryansky Les" State Nature Reserve from 2003 to 2020.

Black grouse

Totally, from 0 to 17 individuals of black grouse were recorded on the routes in various years (on average, 5.5 ± 1.3 individuals) that corresponds to the relative population density from 0 to 6.9 individuals per 100 km (on average, 2.2 ± 0.5 ind./100 km). The population density of black grouse varied over the years with greater amplitude than in capercaillie (coefficient of variation 79.4%). This finding is consistent with the earlier conclusion of Potapov (1987) that the amplitude of fluctuations in the black grouse numbers is significantly higher than in other forest tetraonid species of the Palaearctic. Meanwhile, the black grouse population in the Reserve consistently and significantly decreased (Figure 2): the regression coefficient $a = -0.66$, $R^2 = 0.56$, $F_{(1,15)} = 22.09$, $P < 0.0005$. The most obvious reason for the decline in the black grouse population of the Reserve is the final overgrowing of the former clearings, which makes the habitats unsuitable for black grouse as a species tending to open areas with patches of tree and shrub vegetation (Potapov 1987). In addition, the overgrowing of sphagnum bogs by wild rosemary (*Ledum palustre*) also plays a certain role in shrinking the area of this most preferred

habitat for black grouse in the Reserve (Kossenko & Medvedko 2019). This phenomenon is probably caused by recent changes in hydrological regime of the bogs.

Hazel grouse

In all, from 9 to 39 individuals of hazel grouse were recorded on the routes in various years (on average, 26.0 ± 6.3 individuals). Accordingly, the relative population density ranged from 3.6 to 15.9 individuals per 100 km (on average, 10.6 ± 2.6 ind./100 km). The hazel grouse population density varied markedly over the years (coefficient of variation 34.3%), although not so strongly as in capercaillie and black grouse. There was no clear trend in population density of hazel grouse: the regression coefficient a = –0.10, R^2 = 0.003, $F_{(1,15)}$ = 0.04, P = 0.84). Upsurges in population density occurred in 2004–2007 and 2010–2015, another one has been observed since 2017 (Figure 2). Probably, the observed pattern is due to the population cyclicity, which is generally characteristic of hazel grouse (Potapov 1987; Linden 1989).

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Evaluation of the durability and longevity of lesser prairie-chicken fence tags in Kansas and Colorado

Elisabeth Teige, Nicholas Parker, Megan Vhay and David Haukos

Anthropogenic development, such as buildings, roads, power lines, and fences, have had widespread negative consequences for many species of wildlife (Jennings et al. 2008, Brittain and Craft 2012, Leblond et al 2013, Thompson et al 2015). In addition to disturbance and habitat fragmentation caused by anthropogenic development, it also poses a direct mortality risk of collisions for wildlife (Loss et al. 2015, Hill et al. 2019). In the United States and Canada alone, collisions with buildings are estimated to cause up to 1 billion avian deaths annually (Machtans et al. 2013, Loss et al. 2014, Elmore et al. 2020).

Grouse species in particular are sensitive to changes on the landscape and therefore threatened by anthropogenic development. Oil and gas infrastructure, buildings, power lines, roads, and fences have well documented negative effects on grouse population demography, behaviors, and demographics at varying degrees of severity (Braun 1998, Pruett et al. 2009, Gillan et al. 2013, Hovick et al. 2014, Plumb et al. 2019, Patten et al. 2021). While all forms of anthropogenic development should be carefully evaluated when conserving and managing grouse species, fence lines in particular remain an issue of concern due to their high frequency on the landscape, vicinity to important demographic sites (i.e., leks), and relative ease of mitigating negative effects. In Europe, fences have been identified as a significant source of mortality for black grouse (*Lyrurus tetrix*), red grouse (*Lagopus lagopus scotica*), and capercaillie (*Tetrao urogallus*) in both woodland and open habitats (Catt et al. 1994, Baines and Andrew 2003). In North America, while little evidence exists for fence collisions to be a major source of mortality for greater sage-grouse populations (*Centrocercus urophasianus*; Connelly et al. 2000, Blomberg et al. 2013), fence collisions have been identified as a possible threat for the species (USFWS 2013). Direct mortalities from fence collisions have been observed since the 1940s (Scott 1942); more recent studies in

Wyoming (64 collisions; Van Lanen et al. 2017) and Idaho (56 collisions; Stevens et al. 2012) have shown that fences can pose a mortality risk to greater sage-grouse.

If physical removal of fences is not possible, marking fences with high visibility markers, such as tags or netting, has become a common recommended practice to reduce direct collisions due in part to its low cost and potential mortality risk reduction (Sage Grouse Initiative 2012, NRCS 2015). Marking fences to make them more conspicuous has led to a substantial reduction in the number of collisions for several grouse species in Europe, including red grouse (49% reduction), capercaillie (64% reduction), and black grouse (91% reduction; Baines and Andrew 2003). In North America, fence marking has reduced greater sage-grouse fence collisions by 83% in Idaho (Stevens et al. 2012), and 61% (Christiansen 2009) and 57% in Wyoming (Van Lanen et al. 2017). With many grouse species in decline, fence marking may have a beneficial local demographic effect.

The lesser prairie-chicken (*Tympanuchus pallidicinctus*) is an imperiled prairie grouse of the southern Great Plains that has experienced severe population declines since the 1980s, primarily due to physical and functional habitat loss (Van Pelt. et al. 2013, Haukos and Boal 2016, Hagen et al. 2017). The extent of their occupied range is western Kansas and Oklahoma, southeastern Colorado, eastern New Mexico, and portions of northwest Texas. Intact grasslands across large spatial scales are critical for lesser prairie-chicken conservation; however, the majority of grasslands in the lesser prairie-chicken range are used for cattle production with varying levels of fence density. Across their northern distribution in western Kansas and southeastern Colorado, fence collisions were virtually non-existent and not identified as a major source of mortality for lesser prairie-chickens (Robinson et al. 2016). However, Wolfe et al. (2007) reported high rates of lesser prairie-chicken mortality from fence collisions in Oklahoma and New Mexico at 39.8% and 26.5% respectively. Greater fence densities in Oklahoma was equated to greater collision rates compared to New Mexico (Patten et al. 2005, Wolfe et al. 2007). However, no other study of lesser prairie-chickens has identified fence collisions as a mortality factor (Haukos and Zavaleta 2016).

To reduce potential collision risk for lesser prairie-chickens, Wolfe et al. (2007) recommended removal of livestock fencing or attaching tags to fences to increase visibility. Removal of old and unused fences would be the most beneficial, but is time consuming and expensive; tagging fences presents a more cost efficient and practical solution. Wolfe et al. (2009) proposed use of undersill vinyl siding cut into small pieces and easily snapped onto barbed wire fences as a simple solution to increase fence visibility, as this has shown to be effective for other species. Unfortunately, little is known about how long tags might last, other than that they are expected to last 20 years when applied as siding and tags showed "no visible wear or deterioration" after nearly three years following deployment (Wolfe et al. 2009:142).

We investigated the longevity and durability of fence tags in a portion of the lesser prairie-chicken range in southwest Kansas and southeast Colorado. We walked fence lines marked with fence tags to determine the number of intact and damaged fence tags at an average of five years post-application (4-6 years). Due to the long lifespan expected for this material, we predicted that the majority of tags would remain on fences five years post-application and that relatively few would be damaged. Our goal was to evaluate if applying fence tags to decrease fence collision rates is a reliable long-term conservation strategy for lesser prairie-chicken populations.

Study Area

Our study took place in southwest Kansas and southeastern Colorado on the Cimarron (KS) and Comanche (CO) National Grasslands during 2020 (Figure 1). The U.S. Forest Service manages the National Grasslands for a variety of purposes, including livestock grazing, energy exploration, and recreation. Vegetation on the National Grasslands was dominated by sand sagebrush (*Artemisia filifolia*) prairie but also had areas of short and mixed-grass prairie. A full description of the climate, soil type, and vegetation composition of the area can be found in Berigan (2019). Lesser prairie-chickens were once numerous on these grasslands, but declined to near extirpation by 2013 (USFS 2014). As part of a conservation strategy for lesser prairie-chickens, fences were tagged on both National Grasslands surrounding areas of greatest conservation concern (i.e., occupied habitat, historic leks). Fences were tagged following the recommendations of Wolfe et al. (2009) using white vinyl siding cut into 7.5-cm strips and snapped onto barbed wire fencing. Fences were tagged at a rate of approximately 994 tags/km of fencing spaced on the upper three strands of wire (1600 tags/mile, USFS *personal comm.*). Fences were typically 4 or 5 strand barbed wire supported by metal t-posts and wooden posts.

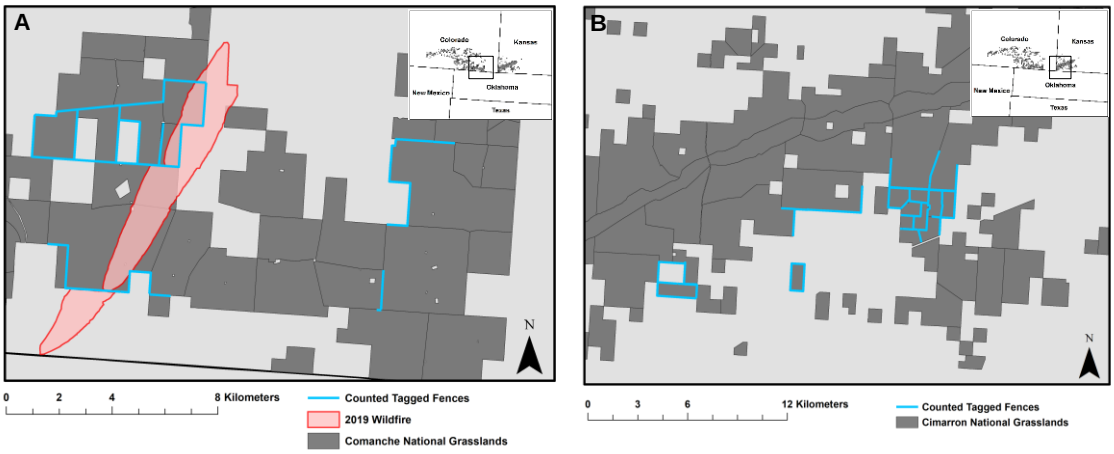

Figure 1. Study sites in the Comanche (A) and Cimarron (B) National Grasslands in Kansas and Colorado, USA, where we walked and counted tags on marked fence lines (blue) during summer 2020. A wildfire event occurred on the Comanche National Grasslands in 2019 (red).

Methods

We evaluated durability and longevity of fence tags by surveying 26 individual fence lines (~100 km) on the Cimarron and Comanche National Grasslands in the summer of 2020, 4-6 years post-application of fence tags. We walked each fence line and counted the number of tags on each fence line and noted the number of tags that were damaged. Tags that were ≥50% broken, unclipped, and warped/melted from fire were counted as damaged (Figure 2A-C). Minor cracks or minor discoloration were not counted as damaged (Figure 2D and E). Total number of observed tags (intact and damaged combined) was summed for each fence line, and compared to an estimated expected count for the length of fence (approximated from a rate of 994 tags/km) using a chi-square test. We derived damage rates for the tags based on a percentage of damaged tags from the estimated number of tags observed. A wildfire (~1,566 ha) occurred on the Comanche National Grasslands in 2019 and several smaller fires also burned in areas marked with tags, affecting approximately 9 km of fence lines. To account for the potentially confounding events of fire on tag longevity, we excluded these fences and tested the proportion of remaining tags relative to expected using a separate chi-square test.

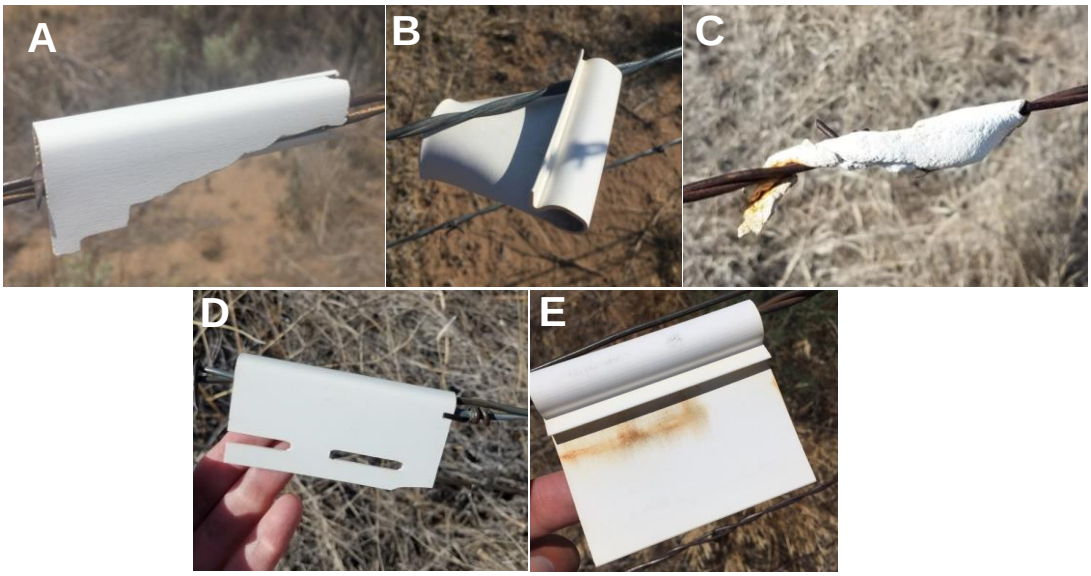

Figure 2. Examples of fence tags that were classified as damaged: ≥50% broken (A), unclipped (B), warped/melted from fire (C), and examples of tags that were classified as intact; minor cracks (D), and minor discoloration (E) from walked marked fence lines on the Cimarron and Comanche National Grasslands in Kansas and Colorado, USA, during summer 2020.

Preliminary Results

We walked and evaluated a total of 26 individual fence lines (~100 km of tagged fences) from July 2 – August 10, 2020. We examined 15 fence lines (~56 km) on the Cimarron National Grasslands and 11 fence lines (~46 km) on the Comanche National Grasslands. Fence line lengths varied from 0.8 to 9.5 km ($\bar{x}$ = 4 km). Using the 994 tags/km metric to estimate the expected number fence tags deployed, the overall average indicated that 3% of remaining tags were damaged (n = 2,841), 18% of tags were missing (n = approx. 18,002), and 79% (n = 78,471) remained intact an average of 5 years after all fences were originally tagged. The range of percent damaged, missing, and intact tags varied among individual fence lines with 0.05% - 15% damaged, 1% - 72% estimated missing, and 13% - 96% completely intact. We found that the number of observed tags (including damaged tags) differed from the number of expected tags (χ^2 = 3,307, df = 25, $P < 0.001$) for all fences. However, excluding four fence lines that were partially or fully burned (approx. 9 km total), we still found that the observed tags (including damaged tags) differed from the number of expected tags (χ^2 = 822.46, df = 21, $P < 0.001$), but there was a greater percentage of tags remaining completely intact (85%) and a similar damage rate (3%) of extant tags.

Discussion

Our study indicates that fences marked with tags on the Cimarron and Comanche National Grasslands lost a significant amount of tags an average of five years post-application. Approximately 15%-21% of tags were lost or broken within five years, indicating that if similar trends continue nearly half of the tags will be gone in another 5-10 years. Given the lack of information on the efficacy of these tags at reducing lesser prairie-chicken fence collisions, it is unknown what number of tags can be lost before they are no longer effectively influence the probability of collisions. It is possible that the roughly 79%-85% of tags remaining on fences are still somewhat effective at reducing collision risk. Concerns for potential increased collision risk would be when many tags are lost in one stretch, creating large stretches of tag-free fence potentially increasing collision risk, compared to loss of one or two tags every few meters with the majority of tags intact across the fence line. Regardless, this method of marking fences has greater longevity than other methods, such as barrier fencing as used in Europe, which had a lifespan of <2 years (Summers and Dugan 2001).

In addition to estimated tag loss, we found that roughly 3% of extant tags were damaged. Unfortunately, it is not known what causes the tags to fall off or become damaged to prevent further losses. Potential sources of damage or loss include the high winds experienced in the region (frequently >60 mph), blowing debris and vegetation (e.g., tumbleweeds), snow/ice, impacts from ranching equipment or vehicles, vandalism, other wildlife or livestock encounters, and weakening from UV exposure. Most of these are longer term effects that damage tags and compromise their structural integrity over time. Therefore, periodic checks and replacement of damaged tags is necessary to maintain the amount of tags recommended.

Our classification of damaged tags was based on the assumption that those that were damaged would no longer be visible to lesser prairie-chickens or those at risk of soon falling off the fence. We did not estimate the number of discolored tags as part of our count of damaged tags. It may be possible that tags lose their effectiveness over time as they become discolored and less visible compared to new white tags. Some work has been done regarding the efficacy of different types and color of these plastic tags at reducing greater sage-grouse collisions (Van Lanen et al. 2017). They found plain white tags and white tags marked with reflective tape to be slightly more effective than colored tags, indicating that the white color of the tags has an added benefit.

The type of vinyl siding used may also determine the durability and longevity of fence tags. There were some areas where fences had tags made of slightly thicker vinyl and did not have the oval holes along the bottom (Figure 2D). While these areas were too few to make a solid comparison, anecdotally these areas appeared to have fewer damaged tags and greater numbers of remaining tags compared to areas with the thinner tags. The oval holes along the bottom of thinner tags often led to damage and cracks. This is one downside of using undersill vinyl siding, as the most common types have such holes that may lower their longevity in this application. Use of thicker and more durable siding may result in a longer lifespan for tags but may be more expensive initially.

The greatest number of missing tags relative to expected numbers were found in areas that had burned. Tags that remained in burned areas were often severely warped, melted, and greatly discolored. This was true for both areas known to have burned in a large wildfire, and in areas that appeared to have experienced prescribed fire. This indicates that fire is one of the biggest potential issues for loss and damage of fence tags. In their original recommendations, Wolfe et al. (2009) noted that fence tags would likely not survive fire, but with the relatively low frequency of fire (both wildfire and prescribed burning) across the lesser prairie-chicken distribution this was not viewed as a concern. While the frequency of fires in our study area (and across the lesser prairie-chicken range) is still very low, fire was historically

an important part of the Great Plains and lesser prairie-chicken ecology. The number of large fires in the southern Great Plains has increased in recent years (Donovan et al. 2017) and the size and frequency of fires in the region are predicted to increase with climate change (Barbero et al. 2015, Cao et al. 2015). As a result, tagging of fences with material susceptible to fire may not be viable in the long term. Additionally, prescribed fire is increasingly recommended as a management technique for lesser prairie-chicken habitat and to control woody encroachment (Fuhlendorf and Engle 2009, Twidwell et al. 2013, Starns et al. 2020). While these practices are not widespread within the lesser prairie-chicken distribution, we anticipate that they will become more commonplace. Monitoring and replacing tags after fire will become imperative to ensure adequate tags are intact and functional. Therefore, use of vinyl siding fence tags will have to be balanced with prescribed burning management strategies to prevent loss of fence tags while also maintaining quality lesser prairie-chicken habitat.

In summary, fence tags are durable as a majority of tags remained an average 5 years post installation. However, we recommend that careful prioritization of fence marking should be considered in respect to other avenues of lesser prairie-chicken conservation such as prescribed fire. Given the probability of losing numerous tags from fire events and general degradation over time, continued fence tag monitoring and maintenance will be needed. As previously mentioned, fence marking has potential benefit for lesser prairie-chickens in areas of high fence density in the southern part of their range (Patten et al. 2005, Wolfe et al. 2007). However, virtually no evidence of fence mortality was found in the northern extent of lesser prairie-chicken range (Robinson et al. 2016) where the range-wide population stronghold occurs (Nasman et al. 2020). Therefore, in areas where fence density is high and fence collisions are a known problem, careful consideration of both sustaining and creating quality lesser prairie-chicken habitat and minimizing direct mortality risks should have financial resources proportionally allocated based on potential need and benefit.

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Longevity of the Lesser Prairie-Chicken

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Abstract

A cock Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) originally captured as a juvenile (<1 year old) in February 2001 lived until February 2007, making him approximately 6 years, 9 months old at time of death. Clapp et al. (1982) reported that the longevity record for the species as 13 years, 6 months. We question the validity of this claim on the basis of longevity records for the similar Greater Prairie-Chicken (*T. cupido pinnatus*), Attwater's Prairie-Chicken (*T. c. attwaterii*), and Sharp-tailed Grouse (*T. phasianellus*), and offer suggestions as to why an erroneous longevity record may exist. We also suggest that our record of nearly 7 years for the Lesser Prairie-Chicken is a more realistic longevity record.

Introduction

Many longevity estimates for wild gallinaceous birds are based on 1) longevity records in captivity, 2) recoveries of banded birds, or 3) "best guesses" based on body size and fecundity. Of those three methods, recovery of banded birds is the most reliable, assuming the bird's age was known at the time of banding. Estimates based on captive birds provide an unrealistic ceiling, as birds in captivity are not faced with constant predator pressures nor do they need to move to foraging sites. Whereas actual longevity records are of less importance than survivorship rates, they do provide insight on rate of generation turnover.

In 1999, we began a long term study on Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*) in north-western Oklahoma and east-central New Mexico. Prairie-chickens captured on gobbling grounds were aged, sexed, banded, and radio-tagged with tuned-loop, bib-mount transmitters weighing ≤ 15 grams. All birds were tracked as often as time allowed, generally at least twice weekly, until they were either found dead or the transmitter batteries expired. Many birds were recaptured in subsequent years and radio transmitters were replaced, allowing for continual monitoring.

Results and discussion

On 20 February 2001, we captured and radio-tagged a juvenile cock Lesser Prairie-Chicken (Sutton Center band number 530) on a gobbling ground in Ellis County, Oklahoma. He was recaptured on several occasions over the next few years, the latest being 1 May 2006, and was tracked a total of 353 times. On 22 February 2007, he was found dead as a result of a collision with a barbed wire fence. At the time of death, this bird was approximately 6 years, 9 months old.

Clapp et al. (1982) reported that the longevity record for Lesser Prairie-Chicken was 13 years, 6 months. This record was based on a bird banded by Verne Davison in Ellis County, Oklahoma, in July 1933 and harvested by a hunter in Roger Mills County, Oklahoma, allegedly in December 1946. We were able to confirm that the band number (U. S. Biological Survey A573718) was placed on a juvenile in 1933 (Davison 1935). However, Oklahoma's hunting season for Lesser Prairie-Chickens was closed from 1934 through 1949 (Copelin 1963). We therefore question that the person who harvested a bird illegally would report the band number to the U. S. Biological Survey. It seems more likely that the band was reported at a later date by someone other than the person who harvested it, or the recovery date was erroneously recorded. In our study of Lesser Prairie-Chickens, we radio-tagged over 900 birds from 1999 through 2015. Among the majority with known fate, only 3 other Lesser Prairie-Chickens were known to have lived longer than 4 years. One being at least 4 years, 10 months old at the time of death (Ellis County, OK, unknown age at capture), one being 4 years, 11 months old at time of death (Roosevelt County, NM), and the third being 4 years, 4 months old at time of death (Roosevelt County, NM).

As for other prairie-chickens, Hamerstrom and Hamerstrom (1973) reported that a cock Greater Prairie-Chicken (*T. cupido pinnatus*) originally banded as a juvenile was sighted on its booming ground for 8 consecutive years, meaning he was approaching 8 years of age when last seen. Considering that the Hamerstroms observed nearly every booming ground in the area for over 20 years, it is unlikely that he survived to the following spring. Even in captivity, the oldest Attwater's Prairie-Chickens (*T. c. attwaterii*) lived only to 9 years, 6 months of age (M. Morrow, pers. comm.), in spite of a long-term, rigorous propagation effort. For the related Sharp-tailed Grouse (*T. phasianellus*), Clapp et al. (1982) reported a longevity record of 6 years, 4 months. These records from congeners cast further doubt on the validity of the claim of 13.5 years for the Lesser Prairie-Chicken.

Using Petrides' (1949) formula for calculating estimated maximum longevity and average mortality rates, we estimated that cock Lesser Prairie-Chickens in Oklahoma could live to be 10 years, 0 months of age, whereas hens, which have lower annual survivorship (Patten et al. 2005), have an estimated longevity of 6 years, 4 months. Since collisions with obstacles, especially barbed-wire fences, is the largest cause of mortality for hens (Wolfe et al. 2007), efforts to reduce collisions may result in

longevity in hens to approach that of cocks. Although the calculated maximum surpasses our observed longevity, it still falls considerably short of the 13 year, 6 month record reported by Clapp et al. (1982). Additionally, Petrides' formula assumes that survivorship is relatively constant throughout the bird's lifespan, a condition seldom met in nature. A single lekking cock may mate with multiple females, so it may be detrimental for a reproductively successful cock to continue to compete with his own offspring. Perhaps, then, this lekking system selects for the onset of senility, which directly affects longevity.

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CONFERENCES

Because of the covid-19 situation, many conferences have been postponed.

The biennial Sage- and Columbian Sharp-tailed Grouse Workshop was originally scheduled for Oregon, USA in June 2020. After postponing it for a year, the organizers decided to make the meeting virtual in June 2021.

The 34th Prairie Grouse Technical Council Meeting, which was scheduled for October 2021 has been postponed to 2022. To follow developments for the rescheduled meeting or to download proceedings from all previous PGTC meetings: https://www.prairiegrousecouncil.org/.

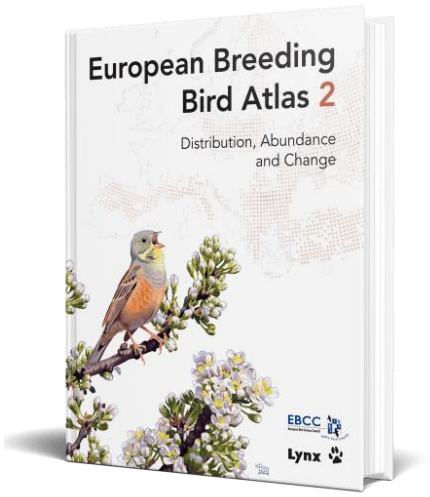
We will also remind you that the 15th International Grouse Symposium planned to be at University of Białystok (UoB), Poland September 2021 is postponed till 2022.

NEW BOOKS

European Breeding Bird Atlas 2: Distribution, Abundance and Change

Determining properly where birds are in this changing world is of paramount importance for their conservation, and doing that at a continental scale is something that can be only achieved under a strong willingness of international cooperation. To do that, the European Bird Census Council (EBCC) is organised as a network of expert ornithologists that boost bird atlas work across Europe.

The first European Breeding Bird Atlas (EBBA1) published by the EBCC in 1997 was a milestone in European ornithology. The project of the second European Breeding Bird Atlas (EBBA2) was carried out by the EBCC network of partner organisations from 48 countries. In total, around 120,000 fieldworkers contributed data to the atlas, the great majority of them on a voluntary basis. As such this project constitutes one of the biggest citizen science projects on biodiversity ever. Data collection and analysis followed a rigorous scientific protocol, led by a team of researchers from ornithological institutes with many years of experience in atlas work.



The huge fieldwork effort resulted in unprecedented geographical coverage for a biodiversity atlas in Europe, including all areas up to the Ural Mountains and the Caspian Sea that were not well covered for EBBA1. These data were mainly collected for the period lasting from 2013 to 2017.

The book presents information on all species reported to breed in the study period and some with more uncertain breeding status. A total of 556 species are treated with a full species account including maps, text and an illustration; information on 69 very rare or irregularly breeding species is presented in an Appendix. Full species accounts include distribution maps at a resolution of 50×50 km (usually showing abundance data), modelled distribution maps with a resolution of 10×10 km (for 222 breeding birds) and change maps documenting changes in distribution since the first atlas.

Original artwork illustrates all species with a full account. Illustrations were provided by 46 artists from 18 countries, with different styles and techniques, reflecting European diversity.

This book represents the most up-to-date source of information on bird distribution and change in Europe, and a great contribution to the global aim of understanding biodiversity to ensure its conservation.

The book can be ordered from Lynx Edicions: https://www.lynxeds.com/product/european-breeding-bird-atlas-2-distribution-abundance-and-change/. 90.00€, ISBN: 978-84-16728-38-1

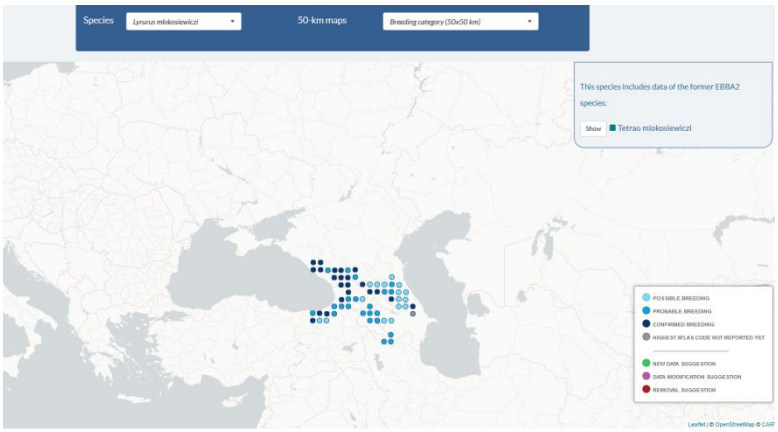
Keller, V., Herrando, S., Voříšek, P., Franch, M., Kipson, M., Milanesi, P., Martí, D., Anton, M., Klvaňová, A., Kalyakin, M.V., Bauer, H.-G. & Foppen, R.P.B. 2020. European Breeding Bird Atlas 2: Distribution, Abundance and Change. European Bird Census Council & Lynx Edicions, Barcelona.

An example of a species from the book.
Caucasian Grouse *Lyrurus mlokosiewiczi*
Siegfried Klaus & Hans-Günther Bauer. Illustration: Adam Dmoch

The global breeding range of the European endemic, monotypic Caucasian Grouse is restricted to the timberline of the Greater and Lesser Caucasus of Russia, Georgia, Azerbaijan and NE Turkey, with the main distribution range in Russia and Georgia. A tiny population of 100–200 birds occurs in the high mountains at the N border of Iran (Habibzadeh & Ludwig 2019). The birds are restricted to subalpine meadow habitats at elevations between 1800 m and over 3000 m asl, mostly between 2000 m and 2800 m, where the leks are found even

on extremely steep grass slopes of up to 45°. They nest on grassy and shrubby slopes between 2000 m and 2600 m. The preferred habitats form a linear chain along the timberline dominated by birch (preferred winter food), juniper, Rhododendron, Vaccinium and Rosa species (Gavashelishvili & Javakhishvili 2010).

The abundance map shows an almost closed breeding range for this resident species, not sufficiently reflecting its quite fragmented distribution across the mountain ridges between the Black and Caspian seas.



The Caucasian Grouse has the smallest range of all grouse species (Gokhelashvili et al. 2003, Isfendiyaroğlu et al. 2007), with a total population of some 34,500–76,500 birds or 11,500–25,500 lekking males [ERL,BLI], the latter probably too low, as no biased sex ratio is apparent (Klaus et al. 2003). The European population is assumed to be stable in the large undisturbed reserves (e.g. Teberda state reserve, S Russia) and to be declining at the S and W edges of its range (<20% over three generations). Main causes for declines are habitat loss by overgrazing and timber and shrub cutting (Etzold 2005) and fragmentation through construction of roads and holiday homes [BLI], disturbance by livestock and men, locally by illegal hunting, and predation by native predators and sheep dogs (Klaus et al. 2003). Meadows used for hay production were found to be particularly important for habitat improvement in Georgia (Klaus et al. 2003), in contrast to excessive grazing by livestock (as in Azerbaijan, Etzold 2005). The Caucasian Grouse has recently been classified as Near Threatened [ERL]. Conservation goals comprise the development of a conservation strategy for all range countries including a network of reserves along the Caucasian Mountain ridges, education, control of overgrazing, and development of controlled ecotourism and birding (Storch 2007, BLI).

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RESEARCHERS AND THEIR BEST FRIEND ASSISTANTS

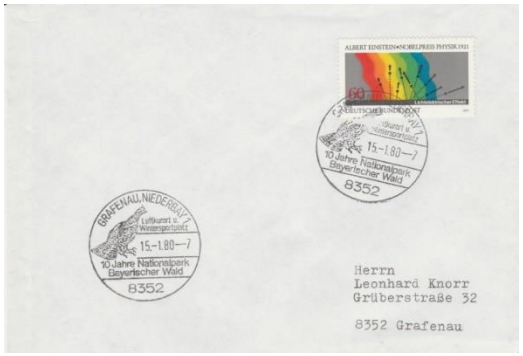
There are certainly a lot of grouse researchers that use dogs as part of their research, as well as many that also use bird dogs for hunting grouse and other upland gamebirds. It has also been our observations that people really like to talk about their dogs, as well as hear about other researcher's or hunter's experiences with dogs or even the companionship side of things. Indeed, if one were to search online book providers for upland gamebird books, there seem to be as many books about dogs as there are about grouse, quail, or pheasants. When we agreed to include this feature, based on the suggestion by Melissa Chelak, we honestly expected to have a lot of submissions, and that this column would become one of the more popular pieces in Grouse News. Perhaps we overestimated, but we are still reasonably sure that there are many readers who would like to share their experiences or virtues of using dogs in research or as hunting companions, so please consider submitting such notes for future issues, and be sure to include a photo or two.

Although Captain, a Belgian Malinois, is not a genuine bird dog, he has been my office mate quite some time, and has been diligently protecting me and my coworkers from squirrels, jaguars, muskox, tigers, or any other creature that he perceives could be a threat to my well-being. Photo by Don Wolfe.

SNIPPETS

Grouse on Stamps

We continue the presentation of grouse on stamps started in issue 59. It started as a presentation of capercaillie and black grouse and it is still many stamps. For more information please see issue 59. You may also contact Ladislav Paule, Zvolen, Slovakia, paule@tuzvo.sk.

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IN MEMORIAM

Alexander Vladimirovich Andreev (1948-2020) – a researcher's life in the Russian Far East taiga and tundra

Our friend, Alexander "Sasha" Andreev, PhD, Professor and Head of the Ornithology Laboratory of the Institute of Biological Problems of the North (Russian Academy of Sciences) in Magadan, Russia, passed away on December 7, 2020. He was born in 1948 in Leningrad. After graduating from Leningrad State University under the supervision of Prof. Malchevskiy and Prof. R. L. Potapov in 1971, he moved to Magadan, where he was employed by the Institute of Biological Problems of the North for his entire life.

Sasha Andreev in his Siberian spruce grouse study area in the Myochan Mountains/Amurland, southeastern Russia, May 2016 (photo by Christoph Unger).

We first became aware of Sasha from his paper "Reproductive behaviour in black-billed capercaillie", published in the proceedings of the 2nd International Grouse Symposium. Sasha had been invited to the symposium, but he, as other colleagues from east of the Iron Curtain, was unable to attend the symposium. Since this time, we have been in continuous contact, exchanging letters, ideas, papers, and planning excursions to northeastern Siberia to see the black-billed capercaillie and Siberian spruce grouse; dreams really, because this area was closed to foreigners.

During Sasha's first visit to Jena, East Germany, in 1979, we saw brilliant slides from this study area and were deeply impressed by his work under harsh winter conditions in the Russian Far East. During 1971-1976 he spent 26 months, including 14 months in winter, studying behavioral, ecological, and physiological adaptations of birds to subarctic conditions. To do this, Sasha built log cabins in the taiga near the Omolon River, conducting fieldwork for months in midwinter, isolated and with only an assistant, who stayed at the cabin. He developed and used his own instruments, which functioned in extreme cold, and methods to study avian winter bioenergetics. For example, he measured ambient temperatures in snow burrows of Hazel Grouse when the outside temperature was below -50˚C. In addition, he discovered many phenomena of the winter life of black-billed capercaillie, Siberian jay, Eurasian nuthatch, and willow tit. Sasha defended his PhD thesis in 1977 and in 1980 he published a book based on his research entitled "Adaptation of birds to the winter conditions of the Subarctic". The book received a governmental award in 1981.

Ten more years were devoted to the summer life of birds in the Arctic tundra. This research focused on breeding-season nutrient and energy balance in various bird species, such as willow grouse, geese, and waders, and was the basis for his DSc thesis, which he defended in 1990.

Sasha was especially interested in the wetlands and waterfowl of Northeastern Russia, especially Arctic geese, due to the long-term decline of their Siberian populations. Under his permanent leadership and deep personal involvement, several international collaborations on long-term marking and monitoring studies started in Northern Yakutia and Chukotka. He published several papers on geese in Northeastern Asia; his first on goose populations in 1997 and a comprehensive review of individual energetics and population dynamics in 2009. Prominent European, Japanese, Korean, and Alaskan scientists cooperated on research in bird ecology, migrations, and conservation. In 1996, he became the vice-president of the Asian Council of BirdLife International, working in the editorial board of the comprehensive volume "Threatened Birds of Asia: The BirdLife International Red Data Book", published in 2001.

One of his favorite groups was Grouse, the object of his student thesis paper at Leningrad University and of his PhD thesis. His detailed ecological studies of individually radio-marked Siberian spruce grouse in the Amur taiga resulted in the first monograph on this species. Studies of black-billed capercaillie resulted in numerous papers and books on breeding biology, winter ecology, and lek

structure, some of them in cooperation with his friends in Austria, the Czech Republic, and Germany. He continued his studies on black-billed capercaillie, with interruptions, up to spring 2020. Jon's advisor, David Boag, encouraged him to meet Sasha, which resulted in cooperative research on the winter social organization of hazel grouse in Sweden and the Russian Far East, including field work there in late winter 1989, when Jon was one of the first Westerners to visit the area.

Sasha was also interested in the protection of bird habitats. He had a deep knowledge of many remote areas important for the protection of bird populations in Northeastern Asia. In 2001, he edited an inventory of North-East Asia Internationally Important Wetlands, the 4th volume of the "Wetlands of Russia", published by "Wetlands International". In 2013, he published the book "Natural Treasures of the Okhotsk and Kolyma Area", with an inventory of the network of Specially Protected Areas of the Magadan Region, and proposed an approach to establish a working system for nature conservation.

Sasha was a talented writer, photographer, and artist with birds being, of course, the favorite objects of his drawings. He was full of knowledge of Arctic ethnography and exploration history. Not just a renowned scientist, but a good friend, has passed away, leaving us now with fond memories of this kind and remarkable person.

Siegfried Klaus & Jon E. Swenson

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