

GROUSE NEWS



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



Galliformes Specialist Group

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From the Editors

In this issue we present a note on stamps with capercaillie and black grouse. This will be followed up in the coming issues until all stamps are presented. Also other grouse species may be presented depending on what we receive. More stamps will be forthcoming in future issues. If you have stamps with grouse species you may submit to the author or co-author.

The covid-19 virus has made much of the world to slow down or stop. Many meetings are postponed. Maybe this also will reduce the field season for some of you this summer.

The 15th International Grouse Symposium is planned on September 12-19, 2021 and will be hosted by University of Białystok (UoB). You should have these dates in mind so you don't miss this conference.

Research articles include documentation of extreme age in Capercaillie, effects of weather events on grouse reproduction, the important and emerging field of galliform parasitology, and the use of stable isotopes in dietary studies. As first introduced in the December 2019 issue, the second installment of "Researchers and their Best Friend Assistants" shows the amazing ability of trained dogs to differentiate grouse species by scat scents; we continue to encourage other researchers that use dogs to submit their observations, photos, or favorite stories to keep this feature going. As usual, a list of Recent Grouse Literature is included, and we ask that all readers continue to bring other literature to our attention.

Finally, it seems that nearly every issue of Grouse News memorializes another great icon of grouse research or conservation that since made their final lek visit. This issue includes memorials to Adam Watson and James Bendell. Both were prolific researchers and inspirations to so many grouse folks for over six decades. Their combined legacies include over 200 publications on grouse throughout their lengthy careers.

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From the Chair

Approximately one year ago I wrote about the thrill of spring in the World of Grouse. The grouse are still going about their business as usual this spring, but for many of us life has dramatically changed. We are denied the opportunity to conduct normal fieldwork, not by weather, but by the COVID-19 pandemic. COVID-19 has affected all of our lives, some more than others. At the present time I am only allowed to leave my house for essentials; surveys of grouse are not considered essential. I tried, and failed, to convince others in my department that conducting surveys for grouse in isolated areas was a low-risk activity for getting infected. However, as a government employee, the issue isn't only about risk, it is also about leading by example. It is difficult to get people to self-isolate if everyone is operating with different sets of rules.

In addition to the suspension of grouse surveys, numerous grouse-related meetings and activities have been cancelled or postponed. The biennial Sage- and Columbian Sharp-tailed Grouse Working Group meeting for the western states and provinces has been postponed for a year. Planned translocations of sharp-tailed grouse from British Columbia to Washington State and greater sage-grouse from Wyoming to North Dakota have been postponed. Fortunately, the International Grouse Symposium (planned for 12–19 September 2021 at the University of Białystok, Poland) and the Prairie Grouse Technical Council (planned for early October 2021 in Montana, USA) are both far enough in the future that they may not be impacted. Modern technology is allowing us to meet regularly from the comfort and convenience of our home offices. We just have to get used to people's pets and children making guest appearances.

The story of this pandemic is changing daily. There is no certainty about how long this will last or what the final damage will be. The reality is that grouse have rightfully taken a backseat to the pandemic response, and when we do think about grouse, our focus is clearly elsewhere. The best we can hope for is that we all do our best to keep ourselves and those we know and love safe. Hopefully we will soon be able to return to a situation where we are once again preoccupied with grouse.

You will notice that there are two "In Memoriam" pieces in this edition of Grouse News; one for Adam Watson and one for James Bendell. Dr. Bendell was present at the first International Grouse



Symposium (officially called the Woodland Grouse Symposium) at Culloden House in Inverness, Scotland in December 1978. He went on to attend 9 of the first 11 symposiums, culminating with the gathering in Whitehorse, Yukon, Canada in 2008. He is visible on the right side of the photo in the third row from the bottom.



The first Woodland Grouse Symposium (later IGS) at Culloden House, Inverness in Scotland 1978. Jim Bendell is on the far right in the third of the photo wearing a light-colored shirt.

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NEWS FROM GALLIFORMES SG

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NEWS FROM GROUSE GROUP

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CONSERVATION NEWS

Status of Southern White-tailed Ptarmigan

In 2010, the U. S. Fish and Wildlife Service (USFWS) received petitions to list the southern subspecies of White-tailed Ptarmigan, *Lagopus leucura altipetens*, as “Threatened” under the Endangered Species Act. As with the southern populations of Rock Ptarmigan (*Lagopus muta*) in Europe and Asia, the Southern White-tailed Ptarmigan, is declining through much of its range in Colorado and New Mexico, due to encroaching timberlines, reduction of alpine willows, and overall warming of alpine areas that may, in some cases, lead to heat stress in this cold-adapted species. The USFWS is now preparing a Species Status Assessment for Southern White-tailed Ptarmigan, and a draft of this document has recently been reviewed by biologists with experience with this species in the states of Colorado and New Mexico. The final assessment is expected later this year.

California and Nevada sage-grouse will not be listed under ESA

Laura Bies

Posted on April 9, 2020

Sage-grouse along the California-Nevada border will not be listed under the Endangered Species Act. ©USFWS

The U.S. Fish and Wildlife Service announced last week that it will not list the bi-state population of greater sage grouse (*Centrocercus urophasianus*), a distinct population of the species found along the California-Nevada border, under the Endangered Species Act. The agency first proposed listing the distinct population segment as threatened in 2013. This proposal was withdrawn by the Service in 2015, prompting a legal challenge. In that case, the federal court vacated the withdrawal in 2018 and ordered the USFWS to reconsider the listing.

Last week, the agency determined that, based on the best scientific and commercial data available, “the threats to the [bi-state grouse] and its habitat, given current and future conservation efforts, are reduced to the point that the [the bi-state grouse] does not meet” the definition of an endangered or threatened species under the ESA.

The Service’s decision relied on cooperative conservation efforts by a coalition of federal, state, tribal, private and non-governmental partners. They stated that that the current success of these efforts demonstrates the ability of these partners to conserve the distinct population segment, without the additional need for protections and regulations of the ESA.

The Bi-State Local Area Working Group, established in 2002, has worked cooperatively for over 15 years to develop and implement a collaborative approach for conservation of the bi-state sage-grouse. According to the USFWS, since 2012, that partnership has “conserved, restored or enhanced more than 100,000 acres of sagebrush habitat in the bi-state area.”

Separately, the Bureau of Land Management has decided not to pursue an appeal in the federal court case in which a judge enjoined the administration from putting their revisions to the 2015 sage-grouse conservation plans in place until litigation surrounding the revisions was completed.

In February, the BLM released supplemental draft environmental analyses for their plan revisions, in an attempt to address the judge’s concerns regarding the administration’s revisions to the plans.

Read TWS’ statement on the 2015 decision not to list greater sage-grouse. <https://wildlife.org/tws-statement-on-not-warranted-sage-grouse-decision/>.

This text is reposted from Wildlife Society where it was posted April 9th 2020 on the following web page: <https://wildlife.org/california-and-nevada-sage-grouse-will-not-be-listed-under-esa/>.



RESEARCH REPORTS

Very old capercaillies recorded in the Northern Alps

Pierre Mollet

Here I report about two capercaillie individuals from the wild, one male and one female, with a very high confirmed age of 10 years and 9 months.

The capercaillie *Tetrao urogallus* is of great conservation concern in many western European countries. Alas, reliable information about population size and trends are very hard to obtain in this shy and cryptic species. In Switzerland, estimations have traditionally been done based on male counts on leks and on indirect evidence (Marti 1986, Mollet et al 2003). Alternative methods rely on transect surveys, where several observers move simultaneously along parallel transects (Rajala 1974, Lindén et al 1996). However, in some parts of the alpine distribution range of this species, neither method is suitable, mainly due to the rugged terrain, but also to the very fragmentary information about lek locations, and to the unpredictable lek attendance of both females and young males.

In an important capercaillie habitat in the northern Swiss Alps, we have established a population monitoring system that relies on individual recognition of the birds based on non-invasive DNA from scat samples and spatial mark-recapture models (Mollet et al 2015, Augustine et al 2020). This system is aimed at regularly producing population size estimations and, after several sampling occasions, estimating recruitment and survival rates.

The study area is located in Central-Eastern Switzerland (Figure 1), on the northern slope of the Alps, and consists of several mid-elevations, mostly wooded foothill ranges up to 1600 m above sea level, separated from each other by deep valleys with agricultural land, towns and some small lakes. The forests on the hills are dominated by Norway spruce *Picea abies* and are interspersed with many small mires and some pastures used for grazing cattle and sheep. Mountain pine *Pinus uncinata* is another important species in the tree layer in some forests, notably on boggy soils.

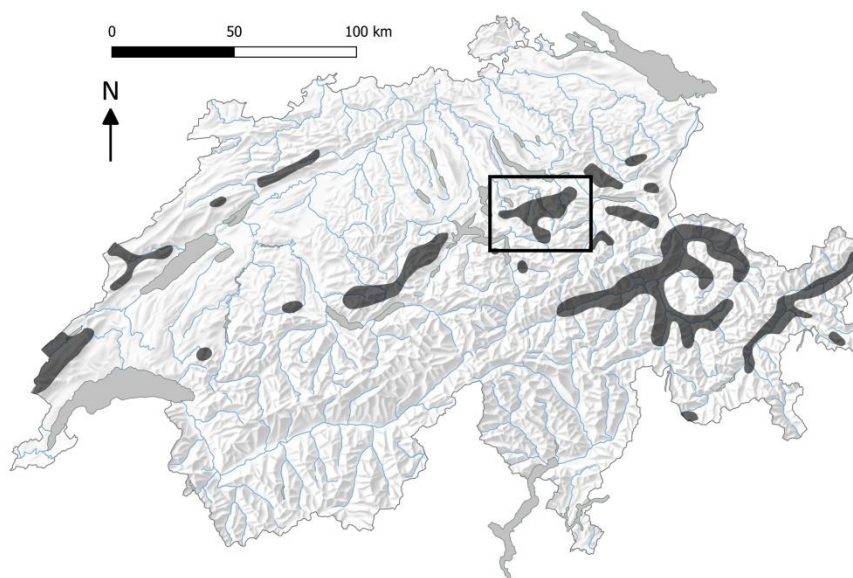


Figure 1. Switzerland and the location of the study area (black rectangle). Dark grey shadings indicate capercaillie distribution in the first year of the study 2009.

Capercaillie distribution in the study area is well-known due to regular surveys carried out by dedicated local bird watchers, gamekeepers, and foresters. It is divided into eight distinctive patches and covers a total surface of about 22 km². Trained volunteers collected capercaillie scat samples across the capercaillie distribution area in late winter 2009, 2012 and 2015. In 2019, four of the eight patches were sampled again. The sampling was always carried out in late winter, but with the entire study area still covered with snow (mid-March to mid-April). In addition, it took usually place 4 to 5 days after the last



snowfall, for making sure that the scats found were not older than 5 days. Extraction of DNA from the scat samples and genotyping were done by Ecogenics GmbH in Balgach, Switzerland, following the method described by Jacob et al. (2010). Ten nuclear microsatellite loci developed for the capercaillie (Jacob et al 2010, Segelbacher et al 2000) and two additional nuclear microsatellite loci, BG15 and BG18, developed for the black grouse *Tetrao tetrix* (Piertney & Höglund 2001) have been amplified three times per sample. Consensus genotypes were established if the results of all three PCR agreed. See Mollet et al. (2015) and Augustine et al. (2020) for further details of field sampling and genotyping methods.

Table 1. The 13 samples assigned to the two individuals, and their sampling date.

Sample nr.	Individual	year	day & month
1	F95	2009	15th april
2	F95	2015	16th april
3	F95		16th april
4	F95		16th april
5	F95	2019	22nd march
6	M67	2009	6th april
7	M67		6th april
8	M67	2012	16th march
9	M67	2015	10th march
10	M67		10th march
11	M67		10th march
12	M67		10th march
13	M67	2019	29th march

The main results from the three samplings 2009, 2012 and 2015 (estimations of population size, annual survival probabilities and recruitment) have been published elsewhere (Augustine et al 2020). In 2019, we re-found two individuals that had been identified in 2009 already, one male (M67) and one female (F95). M67 was found in 2012 and 2015, too, whereas F95 was found in 2015, but not in 2012 (Table 1). Assuming that the two birds had hatched in June 2008 or even in previous years, they were at least 9 months old when their scat was found for the first time. At the time of their re-identification in March 2019, they had therefore an age of at least 10 years and 9 months. This is the oldest confirmed age of any capercaillie in the wild so far found in published material. Koivisto (1961) mentioned a male capercaillie that had been wingtagged as a 3-day old chick on the 1st June 1950 and had been shot on the 25th September 1960, thus reaching an age of 10 years and 4 months. The oldest age according to EURING's longevity list is 9 years 4 months, from an individual with unknown sex that was shot in Sweden (Fransson et al 2017). All scat samples have been found relatively close to the others of the same individual. Maximum distances were approx. 1 km for F95 and 1,5 km for M67 (Figure 2). This corresponds with the data of Koivisto (1961), where the old male was shot approx. 1 km from the place where it had been wingtagged.

Free-living capercaillie can of course grow even older. Whether ringed birds are shot or killed by predators years after ringing or, as in this case, genetically "tagged" individuals are re-found after years: data about maximum confirmed age have so far always been coincidental results of studies with other objectives, and as a result are usually considered of minor importance and hence not published. In the Bavarian Alps, for example, Storch (pers. comm.) once found a capercaillie male, freshly killed by a fox, with a confirmed age of at least 11 years and 2 months. Müller (1979) reported a maximum age of 13,5 years from a male at a study site in Germany. However, if his method of identifying males by their distinct white patterns on the rectrices gives reliable long-term results does not seem to be confirmed so far. Annual survival probability data, too, for example Storch (1993), suggest that we can expect capercaillies to reach considerably higher ages than 11 years.

The main results from the three samplings 2009, 2012 and 2015 (estimations of population size, annual survival probabilities and recruitment) have been published elsewhere (Augustine et al 2020). In 2019, we re-found two individuals that had been identified in 2009 already, one male (M67) and one female (F95). M67 was found in 2012 and 2015, too, whereas F95 was found in 2015, but not in 2012 (Table 1). Assuming that the two birds had hatched in June 2008 or even in previous years, they were at least 9 months old when their scat was found for the first time. At the time of their re-identification in March 2019, they had therefore an age of at least 10 years and 9 months. This is the oldest

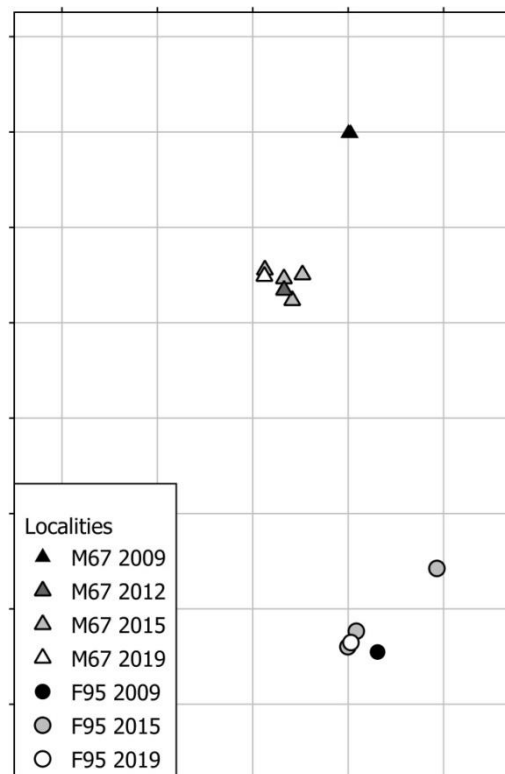


Figure 2. Locations of the scat samples. Grid unit is 1 km.



In genetic identification of individuals, in contrast to the use of classical marks such as rings or wingtags, marks may not be unique. When two individuals share the same genotype across the amplified loci, they appear to be just one. This leads to underestimation of abundance and overestimation of survival (Lukacs & Burnham 2005). To a large extent, this problem can be overcome by using a set of microsatellite loci with high power to resolve individuals. For the particular capercaillie population in our study, we estimated PI and PIsib values (Waits et al 2001) being 5.058E-10 and 1.34E-04 across all 12 used loci (Mollet et al 2015). These values suggest that all 13 scat samples have indeed been correctly assigned to the two individuals M67 and F95.

Acknowledgements

I am indebted to Ilse Storch for making suggestions and providing interesting additional data.

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Greater prairie-chicken reproductive failure following extreme precipitation events.

Dave Londe, R. Dwayne Elmore, and Jimmy Rutledge

Introduction

Predictive models suggest many parts of the world, including the Great Plains of the United States, are expected to experience an increased frequency of short-term but extreme weather events (Meehl et al. 2000). In general, extreme weather is sometimes defined as events that are greater than the 90th percentile of observed values for that weather pattern (Smith et al. 2011). These types of events may include heat-waves with many days of very high temperatures, high rainfall events resulting in flooding, or more discrete events such as tornados, hail, and hurricanes. Reported impacts of extreme weather on animal populations include mass die-offs (Ratnayake et al. 2019), reproductive failures (Bolger et al. 2005), or changes in habitat selection (Tanner et al. 2017). However, as a result of the unpredictable and stochastic nature of extreme weather, few studies capture the impacts of these events on wildlife species, resulting in the effects being averaged out within the larger data set. This is despite that fact that previous research has shown that even short term extreme weather may act as drivers of habitat selection, survival, and population declines of species (Tanner et al. 2017).

As a result of an ongoing study of Greater Prairie-Chickens (*Tympanuchus cupido*) in Osage County, Oklahoma on the Tallgrass Prairie Preserve (The Nature Conservancy) and a number of private cattle ranches, Oklahoma State University researchers were able to record the impacts of an unusually wet spring with multiple extreme precipitation events on the nest, brood, and adult survival of Greater Prairie-Chickens during the 2019 nesting season. Further as this year was part of ongoing research efforts we compared the data from 2019 to trends observed in the previous eight years of the study. In 2019 our study area received approximately 47.3 centimeters of rain during the April-May Greater Prairie-Chicken nesting season, nearly double the long term rainfall average for these months (15-year average: 24.1 cm; Figure 1A). Approximately half of the days during this 61-day period received measureable rainfall

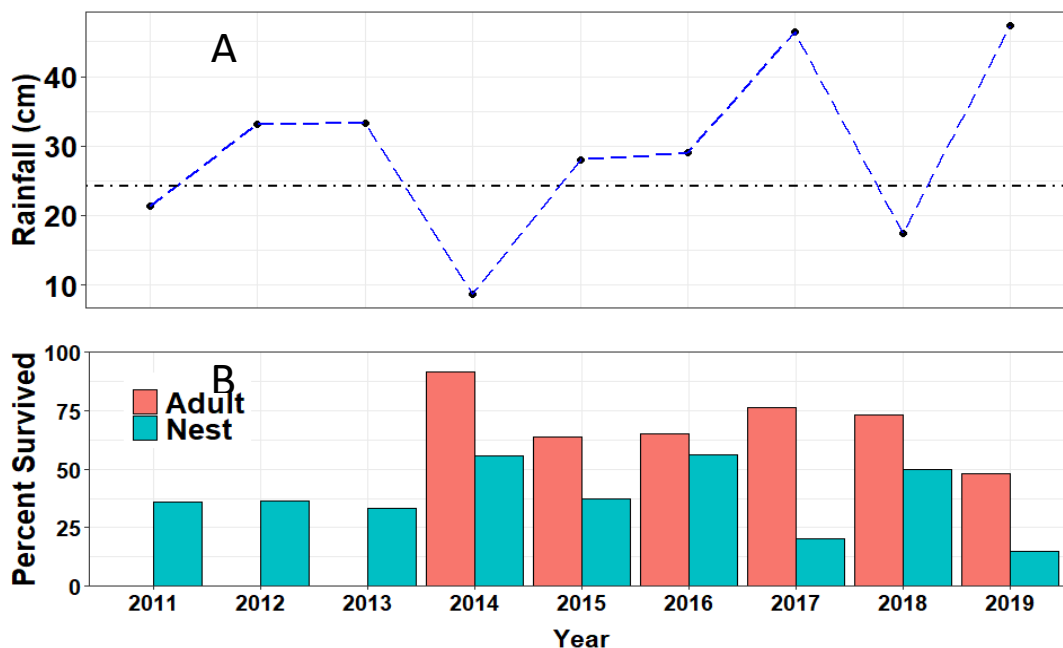


Figure 1. A) Yearly rainfall totals during the April- May Greater Prairie-Chicken nesting season in Osage County Oklahoma from 2011 to 2019. Dashed horizontal line shows the 15-year average for total rainfall during this period. B) The proportion of Greater Prairie-Chicken nests (green bars) and females (red bars) that survived the nesting period in each year. Adult survival was not available during the first three years of the study (2011-2013).

amounts (2019: 30 days; 15-year average: 20.1 days), with six precipitation events producing rainfall totals that were in the upper 90th percentile of observed rainfall totals from the previous 15 years, potentially classifying these storms as extreme precipitation events. Additionally, several of these rain



events were accompanied by large hail, although hail is by nature spotty in distribution and difficult to quantify for any given location.

Results and Observations

During this period, Oklahoma State University researchers were monitoring 24 Greater Prairie-Chicken nests (20 first attempts and 4 renests). The monitored nests occurred over an area approximately 32,000 acres in size (based on a minimum bounding polygon surrounding nests). Only 3 (15%) of the monitored initial nests successfully hatched and no renests were successful during this period. The overall hatch rate for all nests was 13% (Figure 1B), considerably lower than the average success rate of 40.5% from the previous 8 years of the study which included severe drought conditions in 2011 and 2012. Of the 3 nests that successfully hatched, no broods survived longer than 5-days post hatch. Therefore, we estimated a complete reproductive failure for 2019 assuming our monitored hens were representative of the population. In addition to the considerable nest and brood losses, we observed relatively high mortality among nesting females. Of the 25 hens that were being monitored via GPS transmitters at the beginning of the nesting period, only 12 (48%) survived to the end of the nesting period. In the previous 5 years of the study with comparable survival data, average survival for nesting females was 73% (range: 63-91%; Figure 1B). Of the 13 mortalities recorded during this period, 8 carcasses were found within five-meters of the nest bowl. This included one female that was found fully intact on the nest with no apparent external damage (Figure 2). A necropsy of the female showed possible hemorrhaging, indicating the cause of death may have been the result of hail associated with the storm. As there was typically a 2-3day time lag before a hen could be identified as having died at a nest site, it is unclear how many of the 8 female mortalities occurred on the nest due to exposure and were subsequently scavenged versus how many were predated while alive at the nest site.



Figure 2. A fully intact female Greater Prairie-Chicken was found in the nest 3 days after a rain storm that produced 14 centimeters of rain and large hail. The hen's head is not visible as it was tucked under the right wing. Two egg fragments can be seen next to the female indicating possible scavenging of the eggs. The last movement away from the nest recorded by the GPS transmitter for this hen was recorded the morning prior to the storm.



Discussion

If the patterns observed in our sample of radio-marked females are reflective of the population as a whole, our data indicates that Greater Prairie-Chickens in Osage County, Oklahoma likely experienced a near reproductive failure in 2019 which will be exacerbated by the high rates of mortality among nesting females. Further, as much of the broader Flint Hills region experienced similar weather patterns, Greater Prairie-Chicken populations over a considerable area of their southern distribution were likely affected. The rates of nest failure and adult mortality, while not entirely outside of the range of possibility based on previous data, do suggest that the extremely wet conditions of the 2019 nesting season are likely on the edge of what this species can tolerate. Many wildlife species, particularly grouse, have life history traits that allow populations to quickly recover from short-term perturbations such as the one observed in 2019. However, if predictions from climate models are accurate and these types of events increase in frequency, weather patterns may suppress population numbers making Greater Prairie-Chickens more vulnerable to local extinctions particular in fragmented landscapes.

Similar rainfall totals during the 2017 nesting season also resulted in high rates of nest loss but adult survival was not affected (Figure 1B). Over the course of the 2017 nesting season, the Tallgrass Prairie Preserve received 46.3 cm of rain, with six rainfall events being in the upper 90th percentile of recorded rainfalls at this site. In 2017, 20% of initial nests (3 of 15 initial nests) hatched, while 50% of renests hatched (3 of 6 renests). Approximately, 73% of radio-marked females survived the 2017 nesting season (Figure 1B). While it is unclear why adult survival and reneest success was so much lower in 2019 as compared to 2017, it may be attributable to the fact that in 2017 the majority of the rain occurred in April when most hens were just beginning nest incubation, while in 2019 the majority of the rain occurred in mid-May when most females had been incubating for several weeks. Females in 2017 may have been more likely to abandon nests early in the nesting period due to inclement weather in preference for their own survival and reneesting opportunities, whereas females in 2019 that had already invested considerable time into incubation may have been reluctant to abandon a nest during extreme weather, prioritizing the nests survival.

These observational patterns of nest survival are supported by a larger analysis that is currently underway that included nesting data for all nine years of our study. This study is focused on evaluating the long-term effects of weather and drought on the reproductive behavior and nest success of Greater Prairie-Chickens (Londe et al. *in preparation*). As part of this study, we found that one of the strongest predictors of daily nest survival for Greater Prairie-Chickens was short term drought conditions during the April-May nesting season (Figure 3A). Specifically, daily nest survival decreased in years with unusually wet spring conditions and was highest in years with dry springs. Similarly, daily nest survival experienced sharp declines on days with high rainfall totals. Over the course of the nine-year study, weather effects appear to be better predictors of daily nest survival than characteristics of the incubating female (such as age) or broad-scale habitat, such as time since fire, at the nest site.

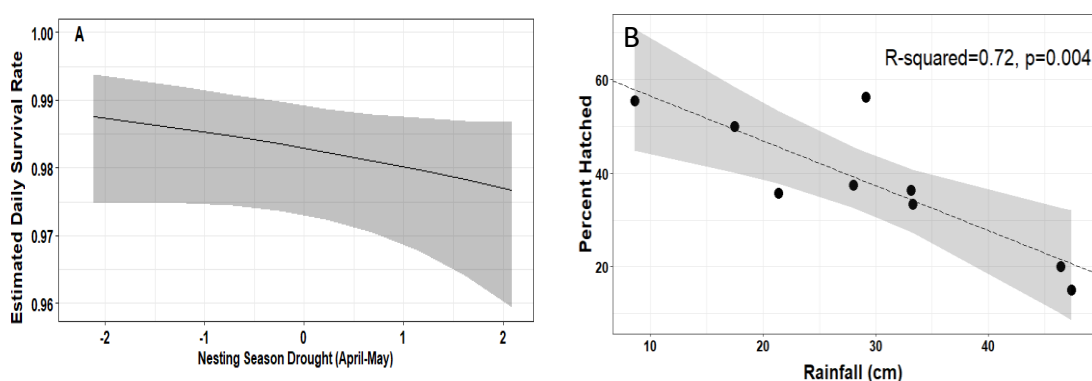


Figure 3. A) Estimated effect of drought conditions during the April-May Greater Prairie-Chicken nesting season on the daily survival rate of nests monitored in Osage County Oklahoma, USA from 2011 to 2019. Drought indices are calculated using SPEI drought index with negative values indicating dry conditions and positive values indicating wet conditions. Panel B) shows the relationship between total rainfall accumulation in centimeters during the nesting season and the proportion of hatched nests in each year of the study based on linear regression. Gray bands in both panels indicate 95% confidence intervals. Data from Londe et al. *in preparation*.



While it is important to note that our observations of high rates of nest failure and adult mortality are based on a limited number of years, these results are highly suggestive of the potential impacts of extreme weather events on many grassland bird species including grouse. If projections are accurate, similar conditions to those experienced in 2019 may become more frequent. The climate of the Great Plains of North America has been historically highly variable, and many species inhabiting these landscapes have likely evolved strategies to cope with this variability (Lovett et al. 2005). However, if extreme weather events become more common, tolerance, local extinctions of grouse populations could occur (Moreno and Møller 2011). As much of the Great Plains is increasingly fragmented, local extinctions may be problematic as colonization probability declines.

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Description of the parasitic community of mountain Galliformes in the Italian Alps. A large scale and long-term monitoring.

Tizzani P., Fanelli A., Chiodo E., Menardi G., Giordano O., Ficetto G., Bessone M., Lasagna A., Carpignano M.G., Molinar Min A., Peano A., Rossi L., Belleau E., Meneguz P.G.

Introduction

Galliformes is a large and diverse group of bird comprising about 70 genera and 281 extant species. Four Tetraonidae (*Tetrao tetrix tetrix*, *Lagopus muta helvetica*, *Bonasa bonasia styriaca*, *Tetrao urogallus crassirostri*) and one Phasianidae (*Alectoris graeca saxatilis*) inhabit the Italian Alps where they have a high biological value, and are of high conservation priority (Brichetti *et al.*, 1992).

Although most of these alpine Galliformes in some parts of their range, are classified as Least Concern (not at conservation risk) by the IUCN Red List of Threatened Species, many populations are red-listed at the national and regional levels because are in marked decline (Storch, 2007).

For this reason, they are included in Appendix I and II of the Birds Directive (79/409/EEC), which provides special measures for their conservation (European Parliament, 2009).

Few and not updated studies are available in literature on the sanitary status of these mountain Galliformes on the Italian Alps (Florio and Gamba 1992; Viganò *et al.* 2012a, 2012b, 2014; Formenti *et al.* 2013), even if recently some works partially filled a gap of information on the shared gastrointestinal parasite community of Galliformes species (Fanelli *et al.*, 2020a, 2020b).

For the conservative management of Alpine Galliformes it would be essential, however, to acquire further information. In particular, there is very little data regarding their parasite community and the impact of parasites on population dynamics (Formenti *et al.*, 2013). Although recent works have increased the knowledge on the epidemiology of the parasite community of some species (Formenti *et al.*, 2013; Fanelli *et al.*, 2020a; 2020b), the main limitation of almost all available studies is the reduced geographical extension of the area investigated, in relation to the range covered by the different host species. Moreover, most of the studies focus very often on only one or few host species, without providing an overview of the characteristics of the parasite community as a whole and of the interactions of the "host - parasite" system of the 5 Alpine Galliformes: *A. g. saxatilis*, *T. t. tetrix*, *L. m. helvetica*, *B. b. styriaca* and *T. u. crassirostris*. Considering that, this study presents the sanitary findings derived from a long-term monitoring of Alpine Galliformes parasites, analysed at the Department of Veterinary Sciences of the University of Turin between 1984 and 2013.

Methods

Data on to the gastroenteric parasite community of 694 animals including the five Alpine Galliformes species is reported. Samples were collected from 16 different Italian provinces (Figure 1).

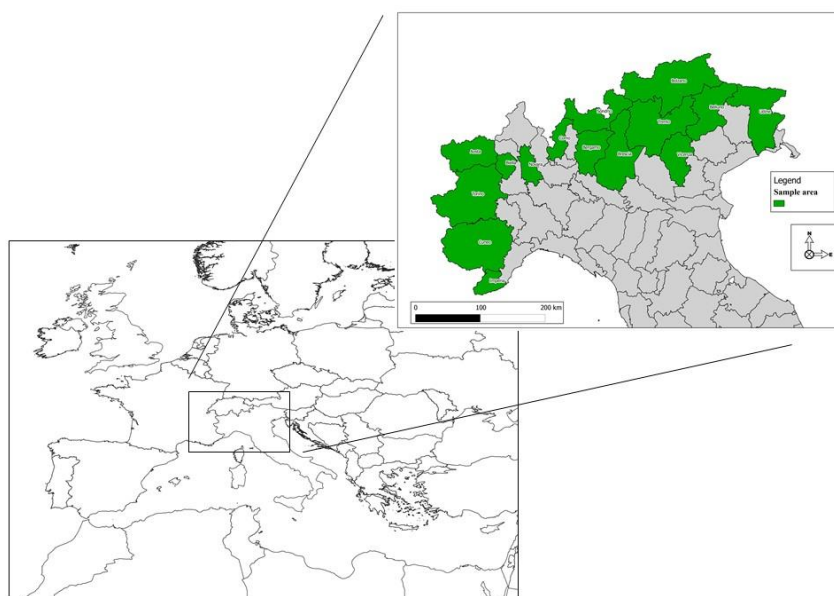


Figure 1. Study areas and administrative divisions from which the samples were taken.



For each animal, we opened the gastrointestinal tract with a longitudinal incision, and the content of the individual sections (proventriculus, gizzard, small and large intestine) was analyzed following the common parasitological standard techniques. Adult worms were counted under a stereoscope (MAFF 1986). We identified parasites at genus level with a light microscope and the identification key provided by Euzeby (1981; 1982) and Skrjabin (1954). Epidemiological characteristics including prevalence (percentage of infested host individuals in each sample), parasite richness (number of parasite species per host) and geographic distribution were calculated for each parasite.

Results

Five parasite genera were detected: three nematodes (*Ascaridia* sp., *Capillaria* sp., and *Heterakis* sp.), one trematode (*Corrigia* sp.) and one cestode (species not identified).

The distribution of the parasite at host level is presented in table 1. *A. g. saxatilis* resulted to be the host species with highest parasite richness (five parasites), while *T. t. tetrax* the one with lowest richness (three parasites).

Table 1. Parasite species reported by affected host species (1= species affected; 0=species not affected)

	Ascaridia	Capillaria	Heterakis	Corrigia	Cestode
<i>A. g. saxatilis</i>	1	1	1	1	1
<i>T. t. tetrax</i>	1	1	0	0	1
<i>B. b. styriaca</i>	1	1	0	1	1
<i>L. m. helvetica</i>	1	1	0	1	1
<i>T. u. crassirostris</i>	1	1	0	1	1

The prevalence of positive animals for each gastrointestinal section is provided in table 2. *T. u. crassirostris* resulted to be the host species with higher global parasite prevalence, followed by *A. g. saxatilis*. Also in this case *T. t. tetrax* was the host species presenting the lower values. In term of gastroenteric tracts, most of the parasites were detected in the small intestine, while the detection of parasites in the other sections was very rare (no parasites were found in proventriculus).

Table 2. Prevalence of parasite species reported by host. Overall prevalence, and prevalence by gastrointestinal sections are reported along with confidence intervals (CI).

	Overall prevalence (CI)	Gizzard (CI)	Small intestine (CI)	Large intestine (CI)
<i>A. g. saxatilis</i> (180)	36.1 (34.8-37.4)	0.6 (0.6-0.6)	27.2 (26.3 – 28.1)	10.0 (9.8-10.2)
<i>T. t. tetrax</i> (295)	10.8 (10.7 – 11.0)	0	10.8 (10.7–11.0)	1.0 (0.9-1.0)
<i>B. b. styriaca</i> (27)	18.5 (17.1 – 19.9)	0	18.5 (17.1–19.9)	0
<i>L. m. helvetica</i> (163)	23.9 (23.1 – 24.7)	0	23.9 (23.1–24.7)	0
<i>T. u. crassirostris</i> (29)	79.3 (73.3 – 85.3)	0	79.3 (73.3–85.3)	0

Finally, the geographic distribution of the positive animals (prevalence values) by host species is provided in Figure 2. The highest prevalence was found in the central and western part of the Italian Alps.



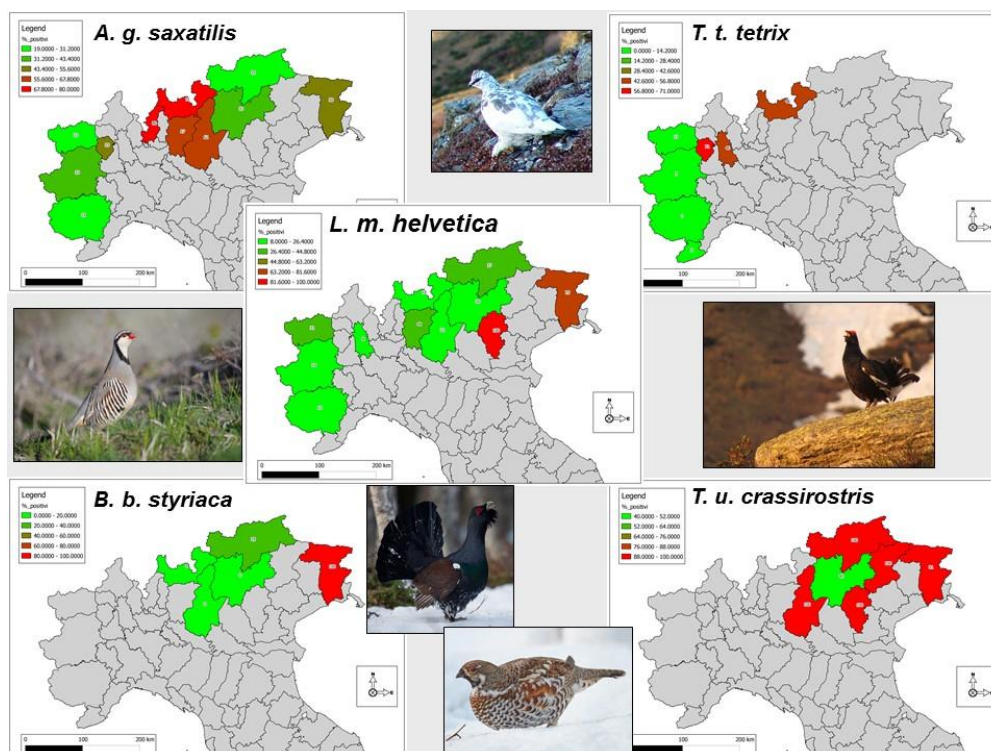


Figure 2. Geographic distribution of overall parasite prevalence by host species. Credits for the photos: Beltrando Fulvio (*T. u. crassirostris*) Giordano Omar (*A. g. saxatilis* and *T. t. tetrix*), Lasagna Angelo (*L. m. helvetica*), Zanini Stefano (*B. b. styriaca*).

Discussion

This paper, even if very descriptive, provides interesting information on the parasite community of wild Galliformes in the Italian Alps. The paper includes data from a relevant number of animals, sampled from a large study area, and aims to fill a gap of information on the sanitary status (even if limited to parasites only) of these birds on the Alps. Moreover, it provides a unique comparative monitoring of the parasite community in the Alpine Galliformes, covering bird species with different biology, ecological needs, conservation status and population densities. The only work in some way comparable with the current one, is the study carried out by Fanelli *et al.* (2020a), that described the parasite community in the Eastern Italian Alps.

Only few parasite species have been detected, with *A. g. saxatilis* being the species with the highest parasite richness. The low parasite richness detected is in line with the recent finding of Fanelli *et al.* (2020a) and with previous studies carried out in Italian Alps (Viganò *et al.*, 2012a,b; Formenti *et al.*, 2013).

T. u. crassirostris resulted to be the species with highest prevalence, with almost 80% of the birds positive for at least one parasite. Considering the current conservation status of this last species in the Western Alps, these findings are quite worrisome. However, considering the unbalanced sample size for the different host species, and the very different environmental, climatic and human-related factors occurring through the Alps, these conclusions have to be carefully evaluated. A more uniform distribution of the sampling effort, by host and by province, would help to better understand the role of each Galliformes species in the epidemiology of the parasite community.

Parasites were mostly reported in the small intestine, confirming also in this case the findings of previous works (Viganò *et al.*, 2012a,b; Formenti *et al.*, 2013; Fanelli *et al.* 2020a;).

Finally, the geographic distribution of the parasite prevalence highlighted the presence of cluster, with most of the cases reported in the central and western part of the study area. The presence of geographic gradient in parasite distribution is in line with the data reported by Fanelli *et al.* (2020a).

The spatial variation of parasitism degree might reflect the influence of different factors like the sanitary management and sanitary status of game birds released in the different provinces, or the influence of environmental conditions. In particular, some studies highlighted that geographic variation in parasite distribution can be seen as a proxy for of the climatic and environmental conditions required for



the development of free-living stages of nematodes (Fanelli *et al.*, 2020a, 2020b; Sanchis-Monsonís *et al.*, 2019).

Further study should be carried out to better explore the sanitary status of Alpine Galliformes, focusing not only on parasites but also on other diseases that may impact the population dynamics. A better understanding of the health status of these species should be achieved to improve any future management and conservation actions for Alpine Galliformes.

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Validation of stable isotope analysis for determining dietary proportions and trophic dynamics in plains sharp-tailed grouse.

Sejer Meyhoff

Abstract

Sharp-tailed grouse and other grassland birds rely on insects and spiders as a high-protein food source during the summer months. Changes to weather and climate, and the influence of agricultural pest management, have the potential to alter the timing and availability of this important food resource. I investigated the relationship between plains sharp-tailed grouse and their arthropod prey using stable isotopes of nitrogen and carbon as biotracers to estimate diet. The isotope signal of an animal's tissue reflects the food that it eats and can be used as chemical tracer to estimate diet proportions. I used wings collected from hunter harvested grouse to analyse the isotope signals in primary feathers 1 to 10 that were grown sequentially over the summer. This resulted in a time series estimate of diet proportions from May to October. I then compared the results to previous diets studies using esophageal crop contents, as well as crops from hunter harvested birds in October collected during this study. I found that the isotope signals from the feathers reflected a much higher consumption of insect prey, mostly grasshoppers, than found in my own crop analysis as well as those of previous studies. I believe the reason for this was that the nutrients gained from consuming insect prey, which are higher in protein than plant foods, were being preferentially routed towards feather synthesis. So even though the grouse were consuming mostly plant foods (shown from crop studies), the insects they consumed were providing grouse with the important nutrients needed to grow their feathers. Since I analysed feathers, and protein from insects was used to grow the feathers, the signal I got reflected insects more than plants. Compound specific stable isotope analysis, which is more expensive, could potentially be used to definitively prove this hypothesis.

Sejer Meyhoff 2020. Validation of stable isotope analysis for determining dietary proportions and trophic dynamics in plains sharp-tailed grouse. MSc thesis University of Lethbridge, Alberta, Canada. The thesis will be available through the OPUS online repository after April 2020.

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CONFERENCES

The 15th International Grouse Symposium Białystok, Poland 2021

The 15th International Grouse Symposium will be hosted by University of Białystok (UoB), on September 12-19, 2021. The 15th IGS is co-organized by three institutions: University of Białystok, the Chapter of Polish Academy of Sciences in Białystok and Olsztyn and Directorate of Polish State Forests in Białystok.

Białystok is the largest city of North-East Poland, with a convenient connection from Warsaw by car or a fast train (2.20 hour ride). The Symposium will be held at the brand-new Campus of Natural Sciences of the UoB.

The 15th IGS will follow the format of the successful 2018 Logan Symposium, with a day of workshops, one-day visit to centers of on-going programs of restoration of the lowland populations of the Black Grouse and Capercaillie, 2-3 days of talks, and post-conference fieldtrip to the Białowieża Forest – a UNESCO World Heritage site. The scope of the conference will highlight the progress made in grouse genetics and physiology as they are applied to conservation and population management.

For enquires please contact the members of the Local Organizing Committee of the 15th IGS: prof. Marek Konarzewski (marek@uwb.edu.pl) and Dorota Ławreszuk (dorota.lawreszuk@bialystok.lasy.gov.pl).



NEW BOOKS

The Moorland Balance.

Building on the success of the first edition, this new and improved version condenses thousands of pages of scientific literature into easy-to-read questions and answers.

Over 200 different studies from across the scientific community are referenced in this book – making it over twice the size of its predecessor. There are extended sections on heather burning, mountain hare and raptors, featuring all the latest findings.

The future of grouse shooting and management of our moorlands have never been more hotly debated. Make sure you have the facts that matter and get a fully-informed, balanced picture of what years of research tells us about moorland management.

Our aim, and the intention of this book, is to present the scientific research so that the discussion is led by evidence rather than emotion. The Game & Wildlife Conservation Trust is well placed to help inform this debate. For over 80 years we have been researching and developing game and wildlife management techniques and have had 135 scientific papers published in peer-reviewed journals on issues relating to upland ecology over the past 46 years.

This research is used to provide advice to such statutory bodies as Defra, Scottish Natural Heritage and Natural England and practical advice and guidance to farmers and landowners. This work is rarely done in isolation. It is possible because of our strong working relationship with other organisations, be it leading universities or other conservation bodies such as the British Trust for Ornithology, the Centre for Ecology and Hydrology and the RSPB.

As such, the 229 references that support the information within this book aren't just from the GWCT. We have drawn from all the leading literature published on the subjects listed in order to provide a fully-informed, balanced picture of what years of research tells us about moorland management.

There are, as in every field, still questions that need to be answered. Our research continues to further public understanding of how the British countryside is managed and long may that continue. We hope that this book serves to answer the pressing issues facing our uplands and encourages a more well-informed discussion about its future.



Game and Wildlife Conservation Trust 2019. The Moorland Balance. The science behind grouse shooting and moorland management. Second edition. Paperback, 134 pages. Published September 2019.



RECENT GROUSE LITERATURE

For a complete bibliography on grouse, go to: <http://www.suttoncenter.org/about/publications/>

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RESEARCHERS AND THEIR BEST FRIEND ASSISTANTS

Canines as biodetectors for conservation work. Charlotte Holmstad Arnesen

Projects concerning operational sex ratio, island biogeography theory and genetic diversity on fragmented rock ptarmigan (*Lagopus muta*) populations were carried out at my University (University of South-Eastern Norway). In these studies, fecal pellets were collected in the southern Norway and central Sweden in the Fennoscandian mountain range. All fecal pellets were identified on species-level to further carry out genetic analysis. Not surprisingly, fecal pellets from the willow grouse *L. lagopus* had also been collected.

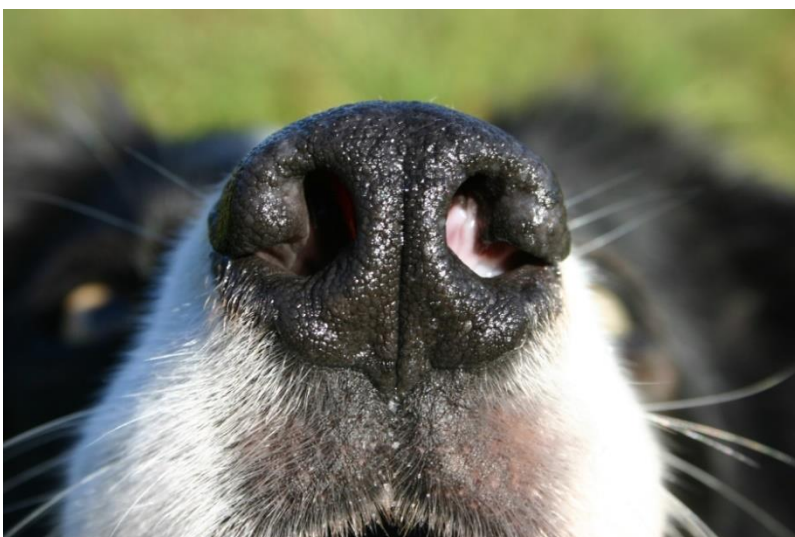
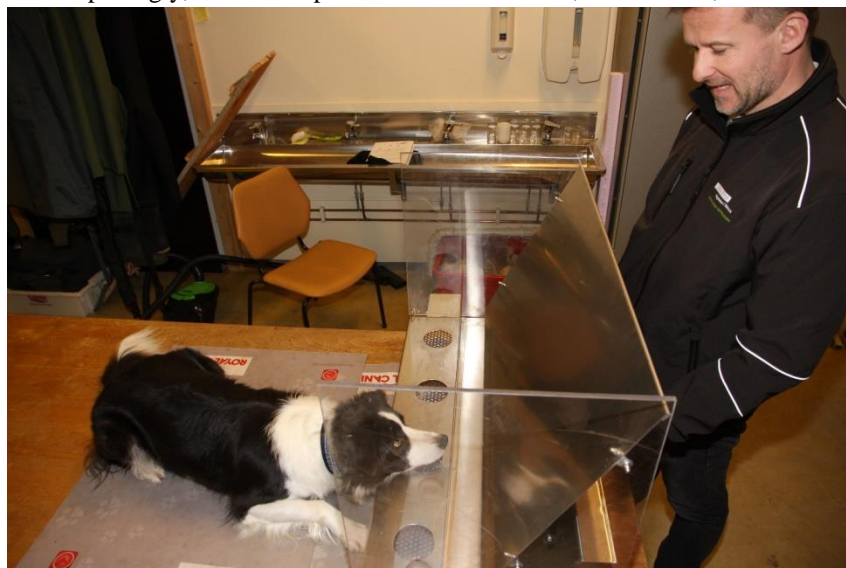


Figure 1. A dog's incredible nose. Photo: Frank Rosell.

The rock ptarmigan and willow grouse share many traits like morphology, genetically, and with the changing climate and increasing human disturbance, more frequently than ever: habitats. The two birds do also share almost the same food preferences, except winter diets if they both occur sympatrically. Not surprisingly, their fecal pellets do also resemble, in both size, structure and color, making it difficult to discriminate between the two species by the researcher's eyes.



My supervisor Professor Frank Rosell has a passion: a dog's keen sense of smell. He knows what the canine nose is capable of and how dogs for many decades have been used as field assistants for conservation, research and management work because of their highly sensitive sense of smell, which he also wrote a book about.

Figure 2. Professor Frank Rosell and Chilli training on the scent platform. Chilli is indicating that the rock ptarmigan is present. Photo: Birgit Espedalen

With a sample collection containing species-identified fecal pellets from both the rock ptarmigan and the willow grouse, we wanted to investigate the dog's abilities to work as non-invasive tools to detect



fecal pellets. We wanted to find out if dogs could detect the fecal pellets from the rock ptarmigan and discriminate it from fecal pellets from other close related birds such as; black grouse (*Tetrao tetrix*), western capercaillie (*T. urogallus*) and willow grouse by using different scent platforms in controlled environments. By training dogs to do so, the researchers could use dogs as pre-scanners to identify species by sniffing on fecal pellets before further DNA-analysis and save cost and time, as the result is immediate. With further field training, dogs could also operate in field searching for fecal pellets.

Note based on the study:

Arnesen, H.C., Johnsen, B.C., Constanzi, J-M. & Rosell, F. Canines (*Canis lupus familiaris*) as biodetectors for conservation work: Can they discriminate the rock ptarmigan (*Lagopus muta*) from the willow grouse (*L. lagopus*) in a yes/no task? PLoS One. 2020; 15(1)

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SNIPPETS

Capercaillie and black grouse on stamps

Ladislav Paule

Among the thousands of stamps issued annually worldwide there is a large proportion of stamps with fauna topics including birds. Most of the stamps are aimed at different bird species inhabiting tropics and subtropics. Numerous stamps are dedicated also to game species either terrestrial or water fowl.

There were so far issued about 65 stamps with capercaillie (both *Tetrao urogallus* and *T. parvirostris*) and 40 stamps with black grouse species (*Lyrurus tetrrix* and *L. mlokosiewiczii*). Apart from these stamps, the postal authorities of Russia, Ukraine, Belarus, Romania and Bulgaria issued numerous stationeries (e.g. envelopes with printed stamps) on which capercaillie and black grouse were a part of the illustrations. Occasional cancellations depicting these four species were used at many occasions (e.g. nature conservation activities, stamp exhibitions, conferences, etc). Within the last two decades, the number of stamps with both species increased which reflects the importance of the nature conservation issues and the declining population size in Central and Southern Europe.

The first stamp showing a capercaillie was a stamp of Tuva (at present the autonomous republic within Russia) issued in 1934. Fifteen years later, the postal authorities in Liechtenstein and Finland issued the next stamps with capercaillie. In 1959, Austria issued a set of four stamps with game animals including capercaillie on the occasion of the Congress of the International Hunting Union (present CIC). This steel-gravure is considered to be a masterpiece among all stamps issued on this topic.

Almost all countries covering the range of the capercaillie occurrence in Europe issued stamps showing the capercaillie males during the lekking period, and only exceptionally also the females (Kosovo, Montenegro, Bosnia and Herzegovina). Black-billed capercaillie was shown only on the single stamp issued by Mongolia in 1961.

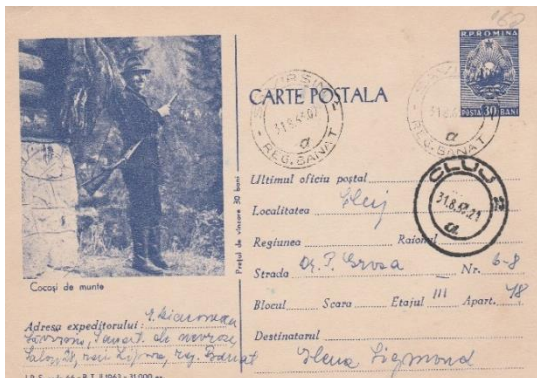
The history of stamp issues with black grouse started in 1950 in Liechtenstein and it was followed by the Soviet Union in 1957, the East Germany (1959) and Romania (1960). Caucasian black grouse was a subject of 8 stamps issued by Georgia and Azerbaijan and a single stamp issued in 1974 by Iran (also within a set commemorating the CIC Congress held in Teheran).

Most of the stamps depicted males, females and chicks appeared mostly on the stationeries. Hunting on capercaillie was shown on two stamps issued in Russia and Albania. Hunting results were illustrated on two stationeries issued in Romania. The times when hunting on capercaillie and black grouse in the Central European countries was allowed are already gone and so these illustrations belong to the history.

There is an interesting issue of Latvia showing aberrated form of black grouse from the collections of the Zoological Museum in Riga. The history of this collection of aberrated birds goes back to the period when the tens of thousands of hunted birds were transported from northern Russia and Siberia to Moscow and Sankt Petersburg and sold on the markets. The curators of the Zoological Museums used this opportunity to collect the aberrated birds for their collections.

For more information and/or illustrations, please, contact Ladislav Paule, Zvolen, Slovakia, paule@tuzvo.sk.







In this issue it is stamps with capercaillie and black grouse. More stamps will be forthcoming in future issues. If anybody has stamps with grouse species you may send it to the editor tk.s.grouse@gmail.com or co-editor dwolfe@suttoncenter.org.

Ring-necked Pheasant on a Sharp-tailed Grouse lek

On a side note, The Minnesota Prairie Chicken Society's Facebook page had this neat video of a Ring-necked Pheasant on a Sharp-tailed Grouse dancing ground, and although the grouse was half the size of the pheasant, he certainly put the exotic invader in his place!

<https://www.facebook.com/kim.fundingsland/videos/3087150351399220/>.

Credit: Kim Fundingsland Brittanys4.kf@gmail.com

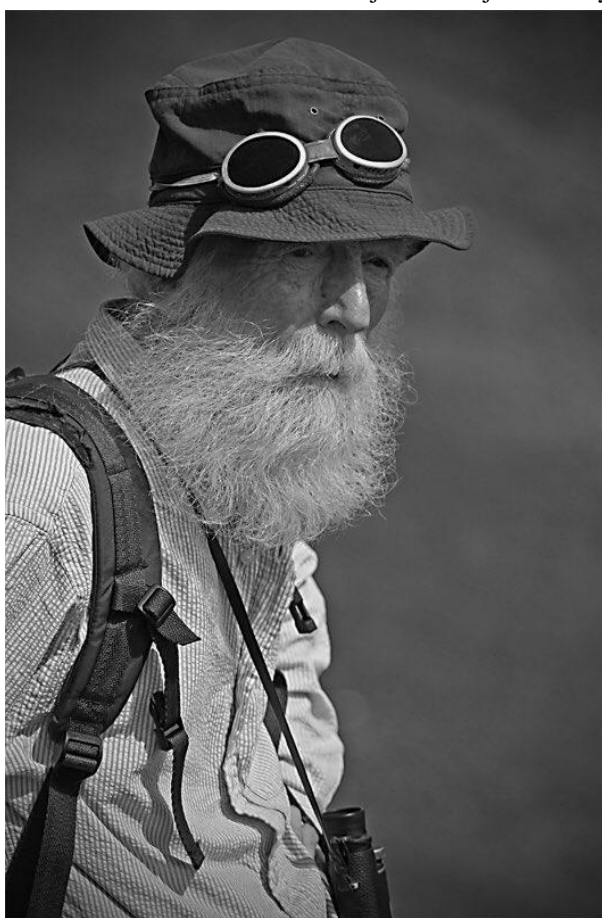


IN MEMORIAM

Adam Watson: 14 April 1930 – 24 January 2019

Adam Watson - a giant in grouse ecology - has left us.

I met him the first time more than 40 years ago at a conference in Finland, when I was just starting to dig into the mysteries of grouse. He was then already renowned among grouse biologists for ground-breaking research on grouse in Scotland. The white-bearded Scot gave an impressive lecture. Sitting down in a chair on the podium, with a long stick pointing at new findings on the screen, he explained in a crystal-clear way the complicated relationships of the red grouse at his study areas east of Banchory. I was eager to learn more and approached him after dinner. And believe it or not: he sat down with me, listened patiently to my rambling questions and carefully guided me along for hours! Not once did he indicate that I was occupying his time and keeping him from more rewarding exchanges with distinguished “grouzers” that mingled in the corridors, like the well-known Russian scientist Semenow Tjan-Sanskij and many Finnish researchers. That was truly a memorable experience! By that time, I was hooked on grouse ecology. So a few years later, when I was embarking on a research project on capercaillie in Norway, I travelled to visit him and his team at the Unit of Grouse and Moorland Ecology in Banchory to learn more. Also memorable: Adam sitting at a big desk in a large, dark (!) office with a few papers and books stacked neatly on the table, with Robert Moss occasionally entering for brief, very quiet discussions about something. Everything very orderly, with punctual, nice tea breaks. Totally different from my messy office and unstructured working routine back home! And again, Adam took time off to answer my many queries. Before I was to return to Norway, I received some advice that I have followed ever since: “Per, in your work, try to stay as close to your birds as possible” – meaning: try to view the surroundings through the eyes of the bird. (Since then we developed some field methods for classifying habitat from cues obtained when scanning terrain characteristics with our head on the ground...!). The other message I received was: “Per, stay away from correlations – if you can – often no causal relationships”. (That we have tried, but - sorry to say - we are now in the midst of doing just that....).



Picture from Robert Moss.

In the years to follow I had little direct contact with Adam – surprisingly and unfortunately I must admit – but I followed closely the research and what was being published from the Grouse Unit. What I didn’t know at first, was the pioneering work Adam did on rock ptarmigan and other natural history in the Cairngorms; he was a passionate mountain man and contributed with new knowledge about mountain ecology in the country.

The research directed by Adam Watson and colleagues Gordon Miller, David Jenkins and Robert Moss in Scotland is a milestone in our understanding of grouse ecology. Their thorough work on social behaviour and nutrition related to population density and regulation is a benchmark and an example of how field research, combined with experiments and manipulations, should be designed and carried out



in order to gain better understanding of complicated biological relationships. I am thankful for having known and learned from this great man.

Per Wegge, Faculty of Environmental Sciences and Natural Resource Management, Norwegian University of Life Sciences, PO Box 5003 NMBU, 1432, Ås, Norway, per.wegge@nmbu.no.

Adam Watson was born in Turriff, Aberdeenshire 14 April 1930 and died 24 January 2019 in Banchory at an age of 88. He graduated from Aberdeen University in 1952, having studied ptarmigan winter ecology and took his PhD in 1956 on the annual cycle of the ptarmigan. He has published more than 30 books, and 600 papers and reports.

He worked for Nature Conservancy unit of grouse and moorland ecology to study population changes in red grouse. Adam and his team led a new study in the north-east Scotland heartland of grouse moors. His Collins New Naturalist book Grouse (2008), co-written with a colleague, Robert Moss, provides the detailed findings.



James Francis Bendell, 1926–2020

Jim Bendell loved to study grouse. For more than 7 decades Jim studied many aspects of the ecology of Sooty Grouse (*Dendragapus fuliginosus*), Spruce Grouse (*Falcapennis canadensis*), Ruffed Grouse (*Bonasa umbellus*), and Rock Ptarmigan (*Lagopus muta*), including morphology, physiology, incubation rhythms, population regulation, habitat selection, territorial behavior, food habits, nutrition, and more. In the words of Kathy Martin, current president of the American Ornithological Society, Jim Bendell was “one of several important elders of grouse biological research in North America.” While Jim’s research also involved songbirds, snowshoe hares, small mammals, bighorn sheep, and insects, his passion was studying grouse. Why grouse? For Jim, grouse were ideal study animals and the means to address some of ecology’s most important questions. However, anyone who knew him knew grouse meant much more to him than that.



Jim Bendell weighing a Spruce Grouse with his wife, Yvonne, recording the data. Photo courtesy of Leah I. Bendell.

Jim’s deep appreciation for nature, ecology, and conservation was no doubt inspired in his youth. He was born and grew up in Toronto, Ontario, where he swam in the Don River, enjoyed the family cottage on the shores of Lake Ontario, and was a Cub and Boy Scout. Later, he was a Sea Cadet and then served in the Royal Canadian Navy Volunteer Reserve, training for the Pacific theater of World War II. When the war was over, Jim took a job at the Wildlife Research Station in Algonquin Park, Ontario, to finance his university education. There he met world-famous scientists and helped in their studies of



important subjects such as wildlife population density and fluctuations. This job was a portent of what was to come.

Grouse research was a way of life and a family affair for Jim. He began working on his dissertation on Sooty Grouse (then known as Blue Grouse) at the University of British Columbia (UBC) in 1950 with his new wife, Yvonne, his high school sweetheart. Yvonne assisted with Jim's field work at Quinsam Lake, near Campbell River, and in many of his studies thereafter. In a memoir, Jim noted that in June 1952 the pair took their first child, a 10-day-old daughter, with them into the field because it was time to count and measure Sooty Grouse chicks. They "kept her in a large, rectangular wooden shopping basket with a strong handle" that was "convenient for moving and taking her with us when we went into the field." With his wife of 68 years, he raised 5 children who "spent many summers in tents or rustic cabins, contributing to the operation." Even at the time of his death, just short of his 94th birthday, Jim was working on a paper on the microclimate of Spruce Grouse and Ruffed Grouse nests with one of his children.

Jim taught at UBC during the 1960s, where he supervised the dissertation of his most famous student, Fred Zwickel. They remained colleagues and friends, working together to improve techniques for the study of grouse, including methods for finding them with trained pointing dogs, censusing them with recorded calls of females, capturing them with snare poles, and tracking grouse fitted with solar-powered radio transmitters, techniques that greatly increased their ability to observe, count, capture, and mark grouse. This paved the way for more productive, rigorous research on territoriality, population dynamics, and habitat, and resulted in many published papers for Zwickel and Bendell and a host of students who followed. Their shared interest in all aspects of grouse culminated in a book entitled *Blue Grouse: Their Biology and Natural History* (NRC Research Press, 2004), which won Zwickel and Bendell the Wildlife Society Publication award in 2005. The two also coauthored the Sooty Grouse and Dusky Grouse accounts in the *Birds of North America* series.

In 1972, Jim accepted a post as Kortright Professor of Wildlife Management at the Faculty of Forestry at the University of Toronto (U of T), a position that greatly interested him because, in his words, the school had "awakened to the importance of ecology and the environment." Ecology had made its way into the Forestry curriculum, and Jim was one of the founding fathers in that context. Jim taught resource ecology and biology courses in Forestry and supervised many graduate students and postdoctoral fellows through the Faculty of Forestry, the Department of Zoology, and the Institute for Environmental Studies. He remained in the Faculty of Forestry, where he inspired a generation of foresters to think of forests as wildlife habitat. He retired from U of T in 1991 as Professor Emeritus.

Like many of his contemporaries, including those studying Sooty Grouse on Vancouver Island (Fred Zwickel) and Spruce Grouse in Alberta (David Boag), Jim believed in establishing a research station to serve as a base camp that would facilitate research and attract graduate students, postdoctoral fellows, and colleagues with diverse interests. Thus, by 1980 Jim had established a new research station at Makwa Lake near Gogama, Ontario, in the heart of the boreal forest. Students and colleagues studied small mammals, insects, songbirds, boreal plants, and the impacts of forestry, but their primary focus was, of course, aspects of the ecology of Spruce Grouse. Jim and his students contributed to the body of research on age determination of Spruce Grouse, habitat use and selection, the food habits of adults and chicks, the incubation behavior and reproductive success of females, population dynamics of Spruce Grouse, and the impacts of forestry and forest insecticides on grouse and other wildlife.

It was at Makwa Lake that we were privileged to work closely with Jim Bendell during our graduate studies, and came to value and appreciate his ideas as a researcher, his knowledge of grouse, and his ability to inspire students. As a supervisor, Jim was both "hands off" and "hands on." He gave students the freedom to go forth and search for new opportunities, but he insisted that field work be based on well-researched, well-constructed hypotheses that were testable. He encouraged students to turn their ideas inside-out, to talk with others, and to look at all aspects of their research objectively. To help with this, Jim invited celebrities from the world of related research to interact with his students, people such as Dennis Chitty, Fred Zwickel, Jack Ward Thomas, Gordon Gullion, and Dan Keppie. Jim and Yvonne also organized memorable evenings at their home where students, professors, and special guests mingled to discuss ideas.

Jim Bendell encouraged students to make careful observations and to test their ideas by devising both field and lab experiments. He taught students timeless skills as well, such as objective, deductive thinking, how to manage large, complicated projects, and the importance of communicating results clearly. We learned to respect his red pen rather than to fear it.

Upon retiring from the Faculty of Forestry, Jim and Yvonne bought a large property consisting of forest, meadow, and marsh near Ottawa, Ontario. They believed that "home is where the habitat is" and they managed their property with that in mind. Jim continued to publish the results of research while living in his new habitat. However, he made time to influence the management of publicly owned forests



and private land through participation on advisory committees. He also inspired others to share his love of nature as a member of the Mississippi Valley Field Naturalists Club in Ontario. In 2008 the club named Jim their “Champion for Nature,” noting that “Professor Partridge’s” contributions as a board member “overwhelmed their record-keeping.”

Colleagues, students, postdoctoral fellows, and friends owe a debt of gratitude to Jim Bendell for his contributions to the body of work on grouse, for the example he set, and for helping us to have the time of our lives.

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