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How the Black Grouse was lost: historic reconstruction of its status and distribution in Lower Saxony (Germany)

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Abstract In the Central European lowlands, the Black Grouse (*Tetrao tetrix*) is restricted to isolated remnant populations. Status reports have been published for some of them, but comparative analyses of Black Grouse dynamics across larger parts of the Central European range are missing. In this paper, we used published and unpublished historic information on local occurrences of Black Grouse in 37,000 km^2 of the German federal state of Lower Saxony to reconstruct changes in the species' distribution and abundance since the 1950s. We calculated population trends over 52 years (1955–2006) using software trends and indices in monitoring data (TRIM). Results showed two phases: an initial crash phase (1950s–1980s) when many local populations went extinct, and a recovery phase (1990s–2000s) for the remnants of the initial distribution. Differences in timing and extent of the crash were related at habitat type. Our study indicates that reconstructing population trends and distributions across larger geographic areas from historic data may enable comparative analyses of drivers of population dynamics across sites, and thus contribute to a better understanding of the causes of Black Grouse decline.

Keywords *Tetrao tetrix* · Population trend · TRIM

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Introduction

The Black Grouse (*Tetrao tetrix*) is adapted to early and transitional stages of conifer forest succession (Lindström et al. 1998; Klaus et al. 1990) and is common in semi-open habitats of boreal Eurasia. In the Central European lowlands, habitat availability for Black Grouse was substantially increased by human land use, like heath farming after forest removal. In the nineteenth and early twentieth centuries, farming-dominated cultural landscapes provided particularly good secondary habitats during a transitional phase of beginning moorland succession caused by drainage and significant decreases in sheep stocks (Wübbenhorst and Prüter 2007). Ongoing declines in Black Grouse population size and numbers have since been reported throughout Central Europe, but especially in the western parts of its distribution (Doenecke and Niethammer 1970; Klaus et al. 1990; Lindström et al. 1998; Loneux and Ruwet 1997; Niewold and Nijland 1979, 1987). With a time lag of about 10 years, marked decreases were also observed further east, e.g. in Poland (Kamieniarz 1997; Kasprzykowski 2002). Possible causes include mainly habitat deterioration, loss, and fragmentation, but also increased predator densities, disturbance from human leisure activities, and climate change (Storch 2000a). Large scale peat exploitation, drainage of moorland, changes in agricultural practices and afforestation beginning around the 1950s are assumed to be the major causes of the loss of numerous Black Grouse habitats from the Central European cultural landscape (Doenecke and Niethammer 1970; Glänzer 1980; Loneux and Ruwet 1997). Although intuitively appealing, this hypothesis has not been generally assessed. A prerequisite would be the availability of historic distributional and abundance data for multiple Black Grouse sites across landscapes. Quantification of landscape level processes could then help answer the question if land use changes are correlated with Black Grouse population dynamics in time and space. The federal state of Lower Saxony, north-western Germany, in the centre of the former lowland distribution range in Central Europe, provides such data since 1976, when a first inventory was undertaken throughout the state (Heckenroth 1985b). However, at this time Black Grouse had already undergone a severe decline in distribution and abundance. Furthermore, inventories provide data for selected time points only. Therefore, the main objective of this paper was to provide a continuous reconstruction of Black Grouse distribution and abundance in Lower Saxony since the 1950s. We also address the questions how intense the declines in Lower Saxony have been and whether regional differences exist in these trends. We applied trends and indices in monitoring data (TRIM; Pannekoek et al. 2005), a modelling software that allows an estimation of annual population size and trends from incomplete historic data. Our reconstruction may help to better understand causes of Black Grouse declines in Lower Saxony and possibly elsewhere in Central Europe by relating reconstructed population trends to land use changes and thus may assist conservation planning.

Methods

Study area

The study area in the North German Lowlands spans 37,000 km^2 and comprises all districts of the federal state of Lower Saxony north of the Mittellandkanal, a channel connecting the rivers Ems, Weser, and Elbe. Until the mid-1970s, the area was delineated into six administrative districts, hereafter: districts (Niedersächsisches Landesamt für Statistik 1967; Fig. 1). Aside from the tidal northernmost parts, the landscape was shaped glacially; hilly landscapes comprised of moraines and outwash planes with sandy soils. The study area is characterized by maritime to sub-continental climates (Deutscher Wetterdienst 1964). Post-glacial rainfall gave rise to raised bogs, which diminish in size and number from west to east. Industrial peat exploitation peaked in all districts after 1950 but reached high levels only in districts with extended peat bogs. Today, the study area is comprised of about 1.3% peat bogs and 0.5% heaths, while 63.1 and 18.7% of the lands surface are mixed farmland and forests, respectively (Niedersächsisches Landesamt für Statistik, Hannover 2005; see http://www.nls.niedersachsen.de).

Data compilation

For the reconstruction of Black Grouse distribution and abundance in Lower Saxony between 1955 and 2006, we collected local information from published and unpublished sources as well as interviews with local experts. We examined data from the Lower Saxony Federal Ornithological

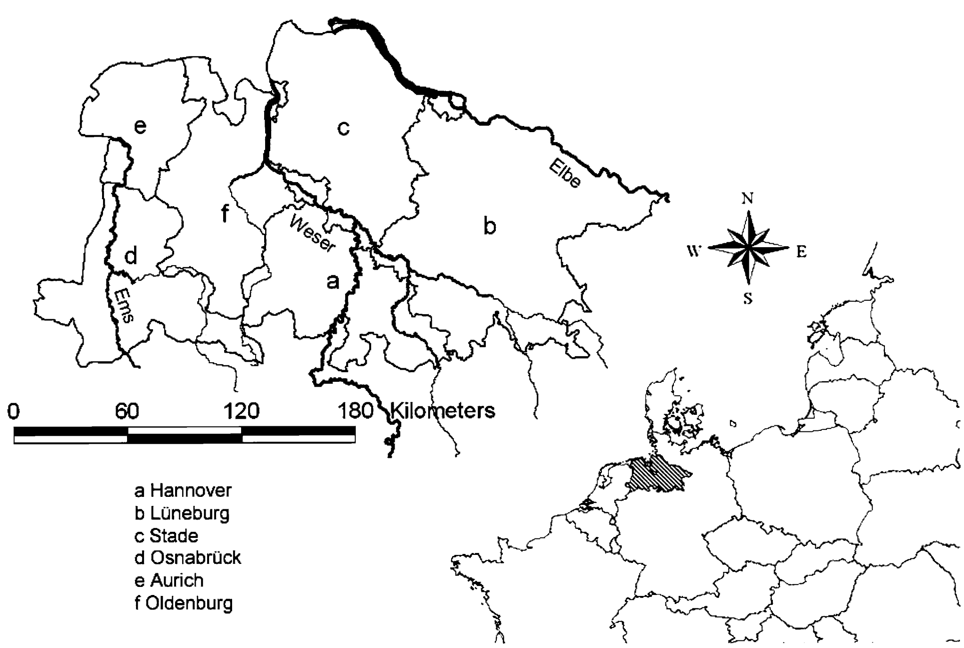

Fig. 1 Location of the study area in Central Europe and its historic delineation into administrative districts

Station and regional bird atlases, single publications, private records and communications from ornithologists, hunters, and other persons familiar with specific areas as outlined in Wübbenhorst and Prüter (2007).

Historic distributional data were a mixture of local distribution maps, lek coordinates and place names that are also used in topographic maps. While local distribution maps and leks already provided spatial information, field names were used to find the locations on a topographic map, scale 1:25,000. With the help of land cover data (digital landscape model 1:25,000, ATKIS, Landesvermessung und Geobasisinformation Niedersachsen 1997) and local expertise we reconstructed total Black Grouse distribution as distinct patches that consist of one or several heath, peat bog or marsh habitat patches from the ATKIS database. Resulting distribution patches had a mean size of 687 ha and were classified according to the predominant habitat type. Geographic centres of distribution patches, calculated with the extension Animal Movement v.2.04 in ArcView, were taken to produce a first draft Black Grouse distribution map consisting of point-shaped locations. Since we do not have information about connectivity among these locations, we avoid usage of the term "subpopulation" but instead use the term "site" throughout the following text.

The data were processed for trend analysis as follows. We assigned annual abundance values, whenever available, to each Black Grouse site. In most cases total number of birds was given. In cases where sexes had been counted separately, we doubled the number for the more abundant sex (usually males), in order to obtain the total number of birds. Data were arranged in a site $\times$ year matrix with 12,349 cells (233 sites $\times$ 53 years), containing either an abundance value (count), "-1" for missing counts, or "0" for all years after extinction of a site. From 233 sites found, we eliminated sites with no count for any year and those abandoned before 1954. This procedure reduced the matrix to 10,653 abundance cells (201 sites $\times$ 53 years). The data gathered came from 66 different sources of which 36 were from before 1979 (see Wübbenhorst and Prüter for all references). A main source was the original data from the inventory in 1976 (Heckenroth 1985b), based on lek counts for 79 of our sites (0.74% of all cells). For the other data, it was not possible to exactly distinguish the seasons for every count but it is reasonable to assume that almost all counts stem from spring when observation of the species is easiest. However, we were able to exclude abundance data on winter flocks in order to obtain a consistent picture of distribution and abundance in spring, i.e. in the breeding season. For similar reasons, we left out the numbers of released birds that have been reported for at least three Black Grouse sites since the 1980s (Augustin 1988; Clemens 1988; Sodeikat and Pohlmeyer 1997). We used historic counts from 1966 provided by hunting organizations with caution, because of the well-known bias in reported Black Grouse numbers (Heckenroth 1975). We therefore corrected these counts belonging to 29 sites by taking only one-third of these numbers. Overall, 33% of abundance cells in the final site-year matrix contained missing values. Important information was the year of extinction and zero counts for subsequent years, making up 54% of the final site-year matrix. The remaining 1,385 matrix cells (13%) consisted of positive counts. Of these, 140 counts had been cautiously estimated as an extrapolation from given counts of previous or following years, assuming that the counts for the data deficient sites add up to the sum available for a higher-order spatial entity like rural districts.

To describe changes in distribution, we calculated for each site the mean distance to the three nearest neighbors (mean3NN, Table 1) at the end of each decade and for the year 2006. To reconstruct regional population trends, we digitized the administrative delineation in the 1960s (Niedersächsisches Landesverwaltungsamt 1967) and assigned each site to one of six administrative districts. We pooled sites from the smallest district Aurich with neighboring Oldenburg, since the former had too few Black Grouse sites to be analyzed separately. We also pooled habitat type marshland and peat bog because marshland sites were too few to be analyzed separately.

Modelling population trends

The site by year-matrix was transposed, to have a row for each site–year combination and its count. Common traits in large monitoring data sets like this are missing counts for individual site–year combinations. In these cases, trends based on index values calculated by so called "chaining", i.e. total number at time t ($t > 0$) divided by total number at time $t = 0$, do not properly reflect population changes; they are influenced by the pattern of the missing values (ter Braak et al. 1994; Pannekoek and van Strien 2001).

Table 1 Mean distances (*mean3NN*) and standard deviation (*SD*) to the three nearest neighboring Black Grouse (*Tetrao tetrix*) sites, taking into account all sites occupied at the end of a time period

Year	No. sites occupied	Mean3NN (km)	SD (km)
1959	196	8.5	3.4
1969	177	8.9	3.6
1979	75	9.9	4.2
1989	29	15.6	9.3
1999	15	22.1	18.0
2006	11	37.8	28.4

We used the freeware program TRIM, Version 3.53 (Pannekoek et al. 2005) to calculate indices and regional trends from the Black Grouse sites data. TRIM uses log linear models that make assumptions about the structure of the counts to obtain better index estimates. The program interpolates missing counts from existing counts and can therefore be viewed as an advanced χ^2-test (Pannekoek et al. 2005). Because sites were abandoned, numerous zeros accumulated in our data set, changing the deviation from a Poisson distribution (overdispersion) and therefore impairing TRIM model fit (for details, see ter Braak et al. 1994; van Strien et al. 2000). To alleviate overdispersion and shorten processing time, we divided the data set between 1979 and 1980. In order not to underestimate standard errors, in all models we selected the respective overdispersion and serial correlation options in TRIM. To obtain trends per decade, we selected the program's option of a linear trend model with years at the beginning of the decades being selected as change points. We also included habitat type as a covariate. For modelling regional trends, we used a linear trends model with a priori selected change points but included district as a covariate. Wald statistic, as provided by TRIM, was used to find significant differences in trends between covariate categories. In all cases, we used a stepwise procedure where TRIM deletes non-significant change points (Pannekoek and van Strien 2001).

Qualitative descriptions of Black Grouse dynamics suggest that, before the 1950s, sites represented more or less interconnected local Black Grouse occurrences (Detmers 1912) that became separated into spatially distinct (sub-)populations in later decades. Therefore, it is likely that we missed Black Grouse sites for the first years of our study period, thereby representing only a fraction of Black Grouse distribution. We checked for this possibility by relating site number to potential habitat area. Every district's potential habitat area was measured as the sum of peat bog and fallow land (Niedersächsisches Landesverwaltungsamt 1952). We used the ratio between potential habitat proportion (peat bog and fallow land) and number of sites for every district as a weight to compensate for the potential underestimation of site numbers and compared modelling results with and without the adjustment. The smallest ratio was scaled to weight = 1, all other districts sites were given a weight by multiplying the ratios with the factor obtained by this scaling. For example, district Stade held 20% of the study area's potential habitat and 57 Black Grouse sites. The resulting ratio of 0.35 (20/57) was the lowest of all districts and therefore scaled to a weight of 1. The factor of 2.86 (=1/0.35), necessary for the operation, led to weights between 1.08 and 3.43 for the other five districts. The weights were included into the modelling procedure by selecting the respective option in TRIM. Fallow land in our example is different from the term in use for today's agricultural areas set aside from cultivation. In the 1950s, it included uncultivated land (a large proportion of heaths) that was still abundant in the area in the middle of the twentieth century (Seedorf 1977).

As a way to validate the plausibility of our results, we formulated the following criteria: for the studies objective to be accomplished, confidence limits should allow to recognize trends. The reconstructed annual total population sizes and their confidence limits should be in the range of the total number of Black Grouse, as published for single years (Popp and Müller 1966; Heckenroth 1997; Wübbenhorst and Prüter 2007). A further criterion was if our reconstructed mid-1950s and 1960s distribution showed more sites than the 1976 distribution map in Heckenroth (1997).

Results

Distribution

Our reconstruction yielded 201 occupied Black Grouse sites for the year 1954 (Table 2). Over the decades, a gradual thinning of the Black Grouse distribution was observed (Fig. 2). Nearest neighbor distances increased slightly from 8.5 km in 1959 to 9.9 km in 1979. Within the next decades, extinction of sites accelerated to NN distances of 15.6 km in 1989 to 37.8 km in 2006 (Table 1). The number of occupied sites dropped from 196 in 1959 over 75 in 1979 to 11 remaining in 2006 (Table 1). Black Grouse disappeared first and most rapidly from the westernmost districts (Osnabrück, Aurich and Oldenburg): year of extinction was positively correlated with longitude ($r = 0.177$, $P = 0.01$). The species now persists only in the Lüneburg district (biogeographical unit, Lüneburger heath).

Population trends

Trend modelling over the entire period from 1954 to 2006 yielded an annual total population change of −8.96% (standard error 0.16). During the 1950s, the total population was stable (Table 3). In the 1960s, a strong decline began, peaked in the 1970s (−17.6%) and continued

Table 2 Initial (1954) number of sites per habitat type and district

District	Heathland sites	Peat bog sites
Hannover	–	23
Lüneburg	33	36
Stade	–	57
Osnabrück	3	32
Aurich and Oldenburg	–	17

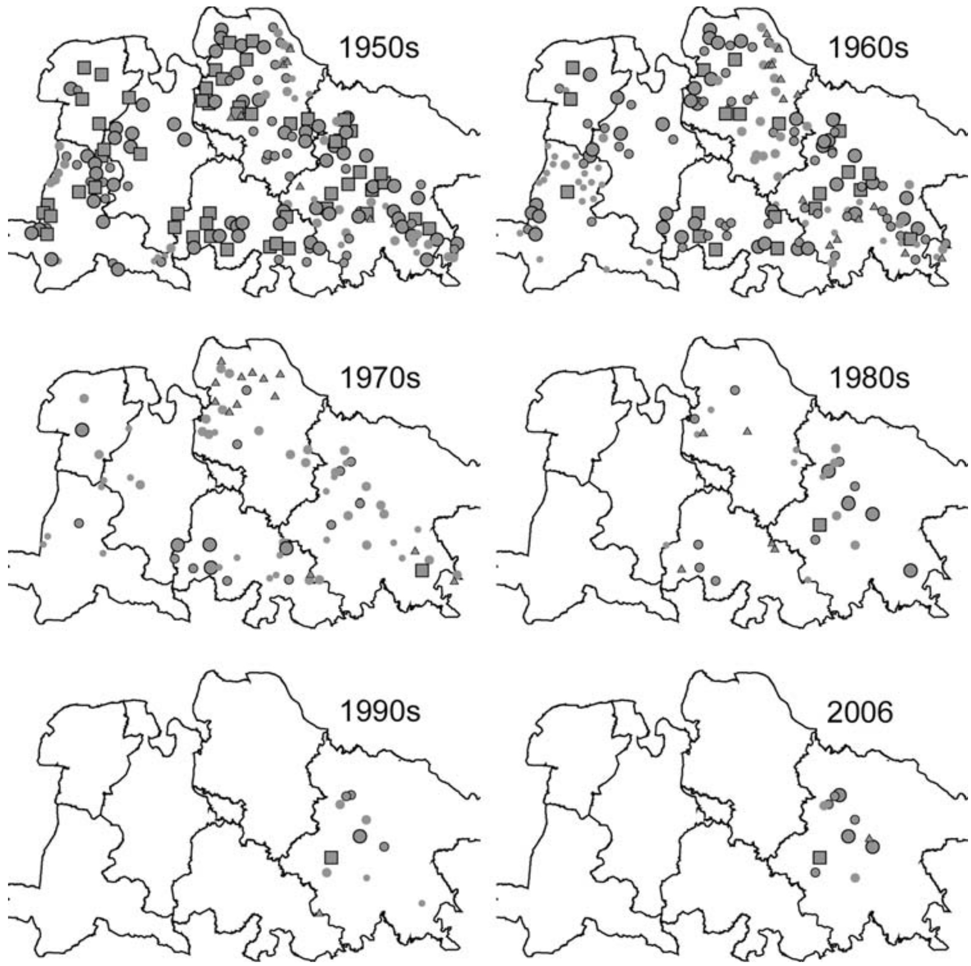

Fig. 2 Reconstructed distribution of Black Grouse (*Tetrao tetrix*) in Lower Saxony for five decades and the year 2006, based on abundance values from the last year of each decade (*filled triangle* single observation, *small shaded circle* 2–3, *medium shaded circle* 4–7, *medium filled circle* 8–19, *large filled circle* 20–49, *filled square* >50 individuals)

throughout the 1980s and 1990s. Since 1999, the total population has stabilized (Table 3). The relatively large standard error for this last period is due to differences between sites. Adding habitat type as a covariate showed significantly different trends for peat bogs versus heaths (Wald-statistic = 508.39; $df = 2$; $P < 0.0001$). While heathland populations already declined, peat bog populations grew until 1959 (Table 4). Thereafter, peat bog populations declined almost linearly and were extinct by the end of the century. Heathland populations showed signs of recovery and stabilization (Fig. 3).

Trends among districts until 1979 were largely consistent with declines of about 40% in the 1960s. However, the Wald-statistic (135.85) for trend differences between districts was significant at $P < 0.01$. This was due to the westernmost district, Osnabrück, in which Black Grouse

Table 3 Mean annual trend (SE) per time period and its significance of difference from zero

Period	Mean annual trend (%)	Cumulative change since 1954 (%)	Wald: significance of change in trend
1954–1959	+1.57 (1.28) n.s.	+3.5	1.49 (no change from 0)
1960–1969	−7.60 (0.76)**	−53.5	25.21** (negative trend)
1970–1979	−17.60 (1.07)**	−94.0	42.12** (amplification)
1980–1989	−6.73 (1.57)**	−95.1	22.75** (attenuation)
1990–1999	−6.63 (2.15)**	−97.9	0.00 (no change)
2000–2006	+4.85 (3.11) n.s.	−97.6	6.22* (trend reversal)

Cumulative change in Black Grouse numbers (%) is given relative to population size in 1954. Significance of change in trend, as compared to the preceding period, was assessed using Wald-statistic (*$P < 0.05$; **$P < 0.01$; n.s. not significant)

Table 4 Mean annual percentage trend (SE in parentheses) in Black Grouse numbers for habitat type heath versus peat bog and significance of difference from zero

Time period	Heathland subpopulations	Peat bog subpopulations
1954–1959	−13.5 (3.81)**	+4.24 (1.11)**
1960–1969	−2.54 (1.6) n.s.	−8.39 (0.63)**
1970–1979	−15.85 (1.74)**	−18.75 (0.80)**
1980–1989	+4.08 (1.73)**	−16.27 (1.54)**
1990–1999	−2.26 (1.59) n.s.	−13.4 (3.12)**
2000–2006	+5.39 (2.37)*	−23.12 (10.21) n.s. (extinction)

Populations on peat bog sites went extinct within the last time period

*$P < 0.05$

**$P < 0.01$

n.s. not significant

sites already had strong declines during the 1950s and were extinct by the early 1970s. Only in the easternmost district Lüneburg did sites recover and persist until today (Fig. 4).

Total population size

We used six total population estimates available for Lower Saxony (Heckenroth and Laske 1997; Fig. 5) to validate our modelling results. All records from between 1976 and 1995 fell within the CI of our annual population numbers and thus agreed well with our reconstruction. However, the record of 7,760 individuals for the year 1964 (Popp and Müller 1966) indicated a possible underestimation of site numbers, and hence total numbers, in the early parts of our data set. Our weighting procedure (see "Methods") resulted in a correction of modelled population estimates by 1,500–2,000 individuals at the start of the time series as shown by the dashed line in Fig. 5. However, the mismatch between our reconstruction and the published 1964 record remained. Until 1979, the unweighted and weighted curves converge. From 1979 on, the weighted yearly sums match those from the unweighted model.

Discussion

Data availability and quality

In our reconstruction, we intended to reveal spatial and temporal patterns of Black Grouse decline and extinction, rather than numerical precision. For Black Grouse distribution, our objective was to provide maps showing the most important areas or distribution centres in each decade. Our abstraction into "sites" is a means to achieve this goal. We do not claim to have regarded all areas where Black Grouse have occurred, which is an impossible task for a species that is capable of shifting its distribution within a few years. For the decades after the 1976 inventory (Heckenroth 1985b) it is reasonable to assume that all sites or distribution centres have been sampled. Consequently, the accuracy of our maps increases from west to east, as also indicated by the ratio between potential habitat proportion and site number (see "Methods").

Available historic Black Grouse abundance data were far from being complete. However, our main objective was to document general trends and not to provide exact reconstructions of annual population numbers. To accomplish a reconstruction over such a large temporal and spatial extent, we had to unite abundance data from different sources and unknown quality. By leaving out or correcting some of the counts (see "Methods") we adjusted the data to avoid overestimation. Nevertheless we think our reconstruction to be robust for several reasons. First, for every site we had more than only one count which is the minimum required. More than 84% of the sites had two or more positive counts. Additionally, zero counts contributed to the model when a site became abandoned. Second, site number was sufficiently large in relation to number of years. If site number is small, model fit can be very good and standard errors small (Pannekoek et al. 2005). With our data model fit as measured by Chi-square test and the Likelihood Ratio or deviance test was always poor. Third, we therefore set the overdispersion option in TRIM.

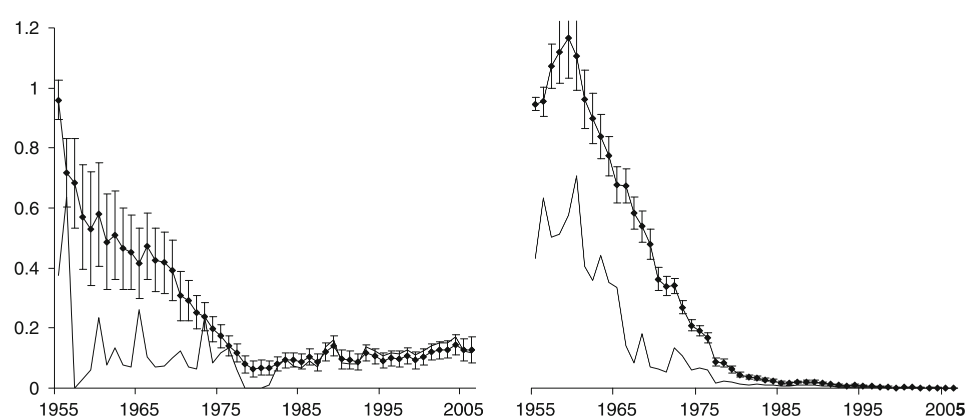

Fig. 3 Reconstructed indices (*upper lines*) with 95% confidence interval (*vertical lines*) for Black Grouse populations in different habitats (*left* heathland, *right* peat bogs). Indices are abundances relative to the abundance in the first year (1954: index = 1). The *lower lines* are indices calculated from the original fragmentary data

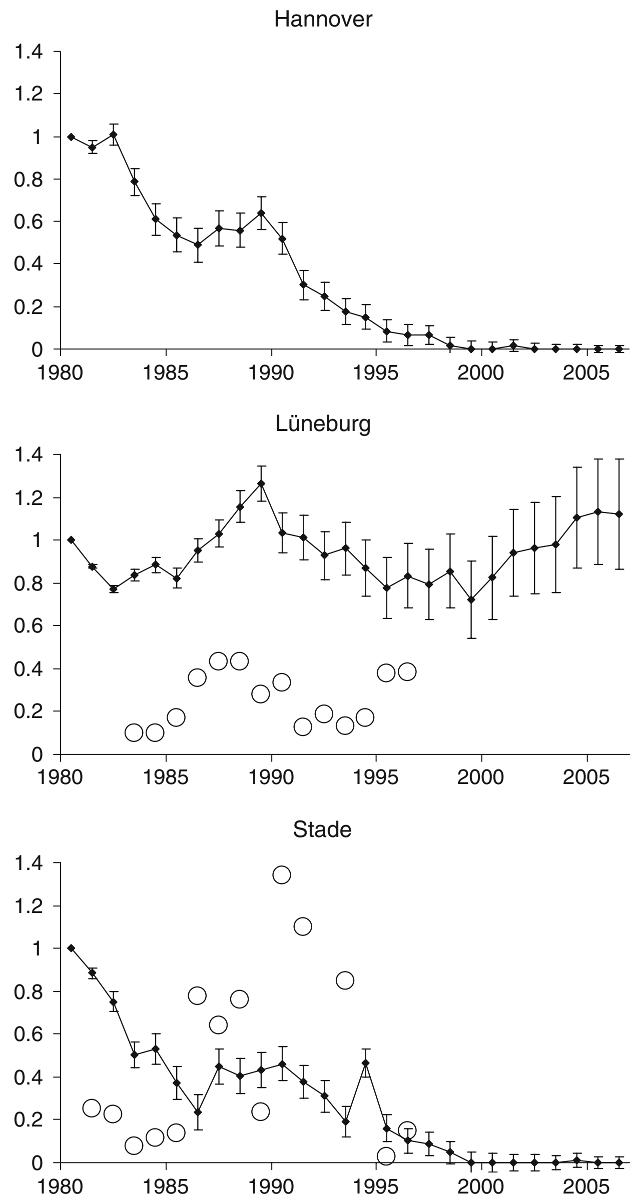

Fig. 4 Indices for Black Grouse populations within districts since 1980 with 95% confidence interval. *Circles* indicate birds released in autumn relative to the total numbers in a district (counts of released birds were not used to model the indices)

Although in this case Aikaike's information criterion (AIC) cannot be used for comparing models, the program converts any lack-of-fit into higher standard errors (Pannekoek et al. 2005). The confidence limits and standard errors therefore provide reasonable estimates of the accuracy of the obtained indices and trends. Fourth, the trend patterns we observed remained the same when we corrected site and population numbers based on habitat availability. We therefore assume our results to correctly depict the general trends of Black Grouse range contraction and population decline in Lower Saxony since the 1950s.

However, specifics such as between-year-fluctuations have to be interpreted with caution. As a rule of thumb, the raw data should contain <50% missing values for prediction of population indices with log linear Poisson regression, (Pannekoek and van Strien 2001). This criterion was met for the period ≥1980 (15% missing values), but not in the first part of our time series (63% missing values). We therefore do not interpret fluctuations for the period 1954–1979, but only the general trends.

Distribution patterns

Our study is the first for Central Europe to summarize Black Grouse distribution across regions since the 1950s and to reconstruct abundance changes with an annual resolution. For Lower Saxony, bird atlas distribution maps of Black Grouse date back to 1976 (Heckenroth 1985a; Heckenroth and Laske 1997). However, the population crash occurred before the late 1970s: number of sites dropped by 63% from 1954 (201 sites) to 1979 (Table 1) while total population size even dropped by 94% (Table 2). Black Grouse sites in the western parts of Lower Saxony, which were dominated by peat bogs, were abandoned earlier than sites located in the heathland dominated east. Early declines might be due to peat exploitation for fertilizer production and conversion of heaths into agricultural land, as also assumed for the adjacent Netherlands, where a steady and significant decline in Black Grouse numbers and distribution has been reported since the 1940s (Eygenraam 1957; Ten Den and Niewold 2000).

Population trends

From before the 1970s only one total figure of 7,760 Black Grouse exists for the year 1964 (Popp and Müller 1966) and has since been widely cited. Our analysis yielded about 4,800 birds (unweighted modelling) and 6,100 birds (weighted modelling), respectively. The existing count might therefore be an overestimation.

Within the 20 years from 1959 to 1979, total Black Grouse numbers dropped from about 7,000–9,000 to 1,000. Similarly dramatic Black Grouse population declines occurred in the 1960s and 1970s throughout the western European lowlands (see Bergmann and Klaus 1994 for summary). With a time lag of about one decade, Black Grouse populations crashed in Poland with an observed 87% decline between 1976 and 1985 (Graczyk 1990) that continued into the 1990s (Kamieniarz 1997). In the Alps, however, Black Grouse populations showed only moderate declines and range contractions. These observations point to large-scale agricultural intensification that proceeded in Europe from west to east, and affected the lowlands to a far greater extent than the Alps

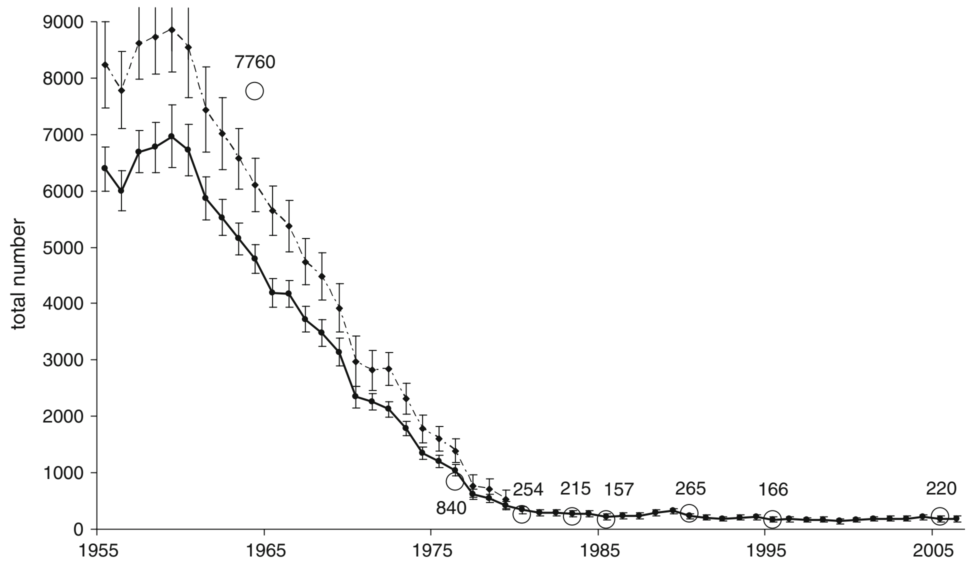

Fig. 5 Unweighted (*solid line*) and weighted (*dashed line*) reconstructed development of the total Black Grouse numbers for Lower Saxony with 95% confidence interval. *Circles* published estimates from Popp and Müller (1966), Heckenroth and Laske (1997), Wübbenhorst and Prüter (2007)

as the major cause of decline and extinction (Loneux and Ruwet 1997; Storch 2000b).

Within Lower Saxony, administrative districts differed slightly in timing and extent of the Black Grouse decline. In the Osnabrück district, the Black Grouse crash started about 5 years earlier than in the rest of the state, whereas the Lüneburg district holds all populations that survived until today (2007). These differences appear to be related to landscape composition, and in particular, availability of peat bog versus heath sites. Habitat-specific modelling indicated a somewhat later, but steeper and total, population crash in peat bog sites as compared to heathland sites. Possibly, land use changes in heath such as afforestation affected Black Grouse earlier than draining and conversion of peat bog margins for farming. However, the overall rate of population change in both habitat types was more or less the same until 1979. The details of our reconstruction for before 1980 greatly depend on the data correction procedure we introduced, and we cannot exclude that the habitat-related temporal differences during the onset of the crash are an artefact due to highly fragmentary data for the early years.

A note on reintroductions

Restocking attempts have been reported for two sites in the northern part of the Stade district and one site in the southeast of the Lüneburg district between 1981 and 1997 (Augustin 1988; Clemens 1988; Sodeikat and Pohlmeyer 1997). During the release phase a peak is obvious between 1985 and 1990 (Fig. 4), suggesting temporary success of the measures. However, the increase is paralleled in the Hannover district, without releases and in remaining sites at least 150 km away from release sites. Therefore, it is implausible that the temporary increase can be attributed to a release of birds. Furthermore, indices for the Lüneburg district are based on further five sites, between 30 and 60 km from the release site. Since only 5–10% of the released birds were relocated the next spring (Sodeikat and Pohlmeyer 1997), there is no indication that local restocking brought measurable success.

Conclusion

During the twentieth century, Black Grouse have become a species of major conservation concern throughout Central Europe. National and European Union level policy (e.g., Natura 2000 protection) is directed at stabilization and recovery of the remaining populations. Most conservation efforts, however, have failed to reverse negative population trends, and the question of whether the causes of decline have been sufficiently understood remains (Storch 2000b). Regional differences in timing and extent of the decline may allow the exploration of alternative research hypotheses, but unfortunately, historic data are scattered and not readily available for analyses across landscape and regional extents. Using the example of Lower Saxony, a federal state in Northern Germany, we demonstrate how local historic records of Black Grouse sites and abundance have allowed the reconstruction of Black Grouse population dynamics at a regional extent and over more than a 50-year time horizon. The spatial and temporal patterns that become apparent from historic population reconstructions may allow important insights into overall and site-specific causes of decline and extinction.

Zusammenfassung

Wie das Birkhuhn verschwand: Historische Rekonstruktion von Status und Verbreitung in Niedersachsen

Im Flachland Mitteleuropas ist das Birkhuhn auf isolierte Restpopulationen beschränkt. Berichte über den Zustand dieser Populationen liegen oft einzeln vor während vergleichende Analysen über größere Teile der mitteleuropäischen Verbreitung fehlen. Diese Untersuchung verwendet veröffentlichte und unveröffentlichte historische Daten zu lokalen Birkhuhnvorkommen im Bundesland Niedersachsen, um Veränderungen in Verbreitung und Abundanz der Art seit den 1950er Jahren zu rekonstruieren. Mit dem Freeware-Programm TRIM (Trends and Indices in Monitoring Data) berechneten wir Populationstrends über einen Zeitraum von 52 Jahren (1955–2006). Zwei Phasen konnten unterschieden werden: eine Zusammenbruchsphase (1950er Jahre bis 1980er Jahre), in der viele Populationen ausstarben und eine Erholungsphase der verbliebenen Populationen (1990er Jahre bis 2006). Zeitpunkt und Ausmaß des Zusammenbruchs unterschieden sich hinsichtlich des Habitattyps. Unser Ansatz deutet an, dass die historische Rekonstruktion von Verbreitung und Trends, über größere geografische Räume, vergleichende Analysen von Faktoren ermöglicht, die die Populationsdynamik bestimmen. Ein besseres Verständnis gebietsübergreifender Ursachen des Birkhuhnrückgangs könnte dadurch erreicht werden.

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