Monitoring gamebird abundance and productivity in the UK: The GWCT long-term datasets

Nicholas J. Aebischer & David Baines

Because of the economic importance of gamebirds, land owners and game managers have long been interested in monitoring local abundance and productivity through counts and bag statistics. The National Gamebag Census (NGC) and Partridge Count Scheme (PCS) of The Game & Wildlife Conservation Trust (GWCT) were formally established in 1961. The NGC collects bag statistics on all game species from over 600 estates annually, and its records extend back up to 200 years. The PCS collects information on abundance and productivity of partridges from around 100 lowland estates annually since 1933. The count programme was extended in 1971 to monitor abundance and productivity of upland grouse. Using these data, we present long-term trends for five huntable bird species, several of which are poorly covered by other national schemes. Despite potential difficulties of interpretation due to shooting pressure and representativeness, the GWCT datasets usefully complement other UK bird monitoring schemes.

Key words: Galliformes, bag statistics, long-term trend, index, abundance, productivity, UK.

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An understanding of how bird numbers and productivity change over time is crucial to effective conservation and management. This is especially true for huntable species such as gamebirds, which can be of considerable economic importance but can also be vulnerable to overshooting. Indeed, for these species, the European Union's Birds Directive (79/409/EEC) requires its member states to ensure that hunting is compatible with maintaining their populations at a satisfactory level, and complies with the principles of wise use and ecologically balanced control. Implicit in these requirements is the need, at the very least, to monitor population change.

In the UK, unlike in North America and much of Europe, ownership of land extends to the game living on the land (Strutt 1801, Myrberget 1991). As a result, game has historically been an important source of revenue for UK estates (Tapper 1992). For more than two centuries many estates have, as part of game management, monitored local game abundance and productivity through counts and numbers shot (the "bag"). Middleton (1934) made a first attempt to collate UK game bag data as well as building a national picture of game abundance (Middleton 1935, 1936, 1937). After the Second World War, he revived a survey of UK sporting estates begun in 1938, and in 1961 he formally established the National Gamebag Census and Partridge Count Scheme. These were administered by the then Game Research Association, now The Game & Wildlife Conservation Trust (GWCT).

The GWCT's long-term datasets therefore fall into two categories. The datasets within the National Gamebag Census are based on numbers of birds shot annually by hunters. Because of the length of the time series, some of which start in the 19th century, they provide a unique insight into historical trends, but reflect hunting effort as well as species abundance. By contrast, the datasets within the GWCT Count

Schemes are based on intensive spring and autumn counts of live birds on the ground. They provide accurate measurements of density and productivity, but the number of sites is limited and not random.

These datasets are of interest because the span of time that they cover is considerably greater than that of other UK bird monitoring schemes, and often the species involved are poorly covered by other national schemes. In this paper, we present trends in abundance and productivity of five huntable species extending back over at least a century, and discuss the reliability of such trends in relation to other UK schemes.

Materials and methods

National Gamebag Census

The GWCT's National Gamebag Census (NGC) is a voluntary scheme that currently collects bag statistics on all game species from over 600 UK estates annually (Tapper 1992). At the end of each shooting season, each participant completes a form detailing the numbers of each species shot, numbers released, numbers of shoot days, estate area and, in the case of upland estates, moorland area. In many cases, additional data extracted from game books extend the time series back to at least the 19th century.

GWCT Count Schemes

The GWCT's Partridge Count Scheme (PCS) collects information on annual abundance and productivity of the Grey Partridge *Perdix perdix* and Red-legged Partridge *Alectoris rufa*. It is a voluntary scheme, based on intensive counts of pairs in spring and counts of young and old birds in the autumn. Counting takes place at dawn and dusk, using a 4-wheel-drive vehicle to drive around field edges and criss-cross stubbles. Returns are annual, and include the area counted. From 1933 to 1998, the scheme involved around 100 lowland estates mainly in the east and south of England (Potts 1980, Potts & Aebischer 1995). Since 1999, it has been expanded as part of the GWCT's commitment to the UK Grey Partridge Species Action Plan and by spring 2004 there were around 1,350 registered participants (Aebischer & Ewald 2004). Potts (1986) showed how it was possible to estimate Grey Partridge chick survival rate to six weeks based on brood counts.

In the British uplands, the GWCT began monitoring the abundance and productivity of Red Grouse *Lagopus lagopus scoticus* in 1971 in England and 1976 in Scotland (Hudson 1992). Counts are carried out by professionals in March and July on blocks of moorland of approximately 1 km^2, using pointer dogs to locate birds either side of transects roughly 200 m apart. Although the total number of sites counted exceeds 150, only a core of 35 sites has been counted for 15 years or more. Counts of Black Grouse *Tetrao tetrix* began in 1991, involving spring counts of males at leks and, as for Red Grouse, dog counts of adults and broods in late July and August (Baines 1996).

Statistical analysis

For this paper, data were analysed for five of the species covered by the NGC, namely Grey Partridge, Red Grouse, Black Grouse, Snipe *Gallinago gallinago* and Woodcock *Scolopax rusticola*. These are all species that are red- or amber-listed as UK Birds of Conservation Concern (Gregory *et al.* 2002), which occurred on fewer than 10% of squares surveyed by the British Trust for Ornithology (BTO) in its Breeding Bird Survey of 2003 (Raven *et al.* 2004), and for which NGC data extend back to at least 1900.

NGC bag returns from 1900 to 2002 for each species were analysed by generalised linear modelling (McCullagh & Nelder 1996) with estate and year as factors, using a Poisson error adjusted for overdispersion and a logarithmic link function. The logarithm of estate area (Grey Partridge, Snipe, Woodcock) or of moorland area (Red Grouse, Black Grouse) was specified as an offset so that the dependent variable was effectively bag density. An index of bag density was obtained by exponentiation of the coefficients estimated for the year factor, expressed relative to the first year of the series. Approximate standard errors of the index values were derived from those of the year coefficients by Taylor series linearisation (Seber 1982). A smoothed trend line was fitted to the series of index values using a cubic smoothing spline function of time with 12 effective degrees of freedom (Hastie & Tibshirani 1990). For each

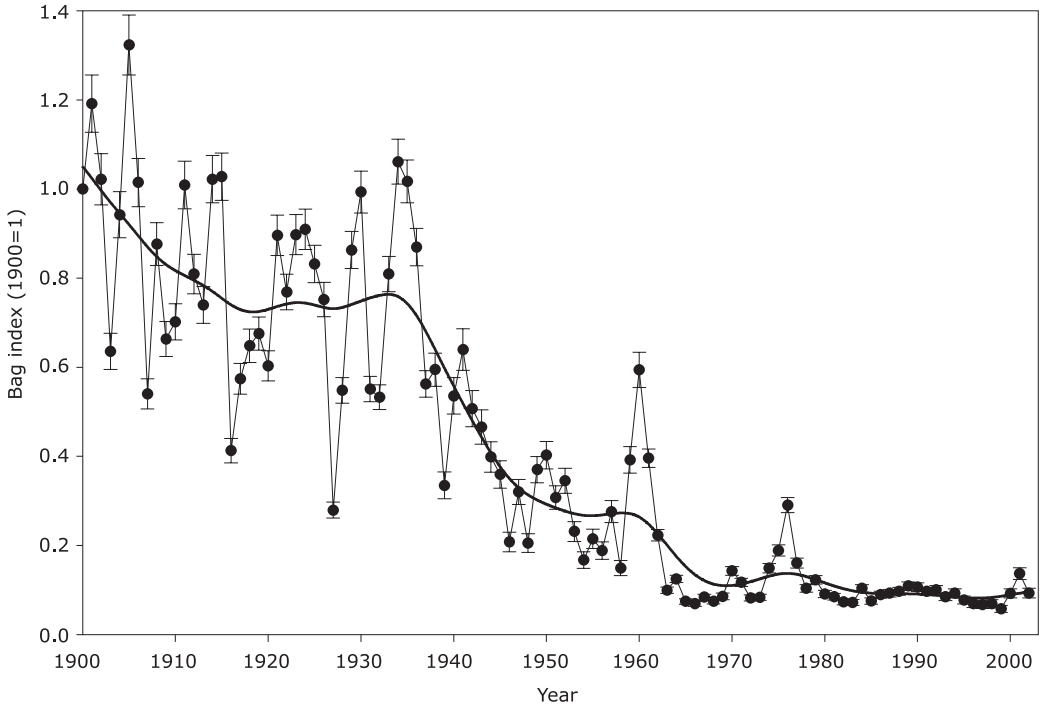

Figure 1. Grey Partridge index of bag density from the GWCT's National Gamebag Census, 1900-2002 (data from 1,180 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de captures de Perdiu Xerra a partir de les dades del Cens Nacional de Caça 1900-2002 (dades de 1.180 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

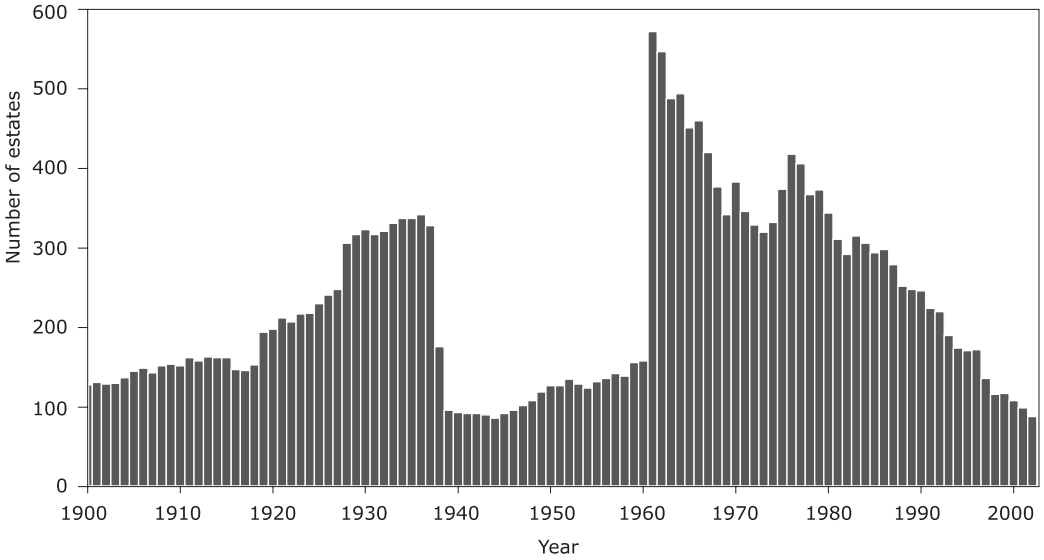

Figure 2. Number of estates contributing bag data on the Grey Partridge to the GWCT's National Gamebag Census in each of the years 1900 to 2002.
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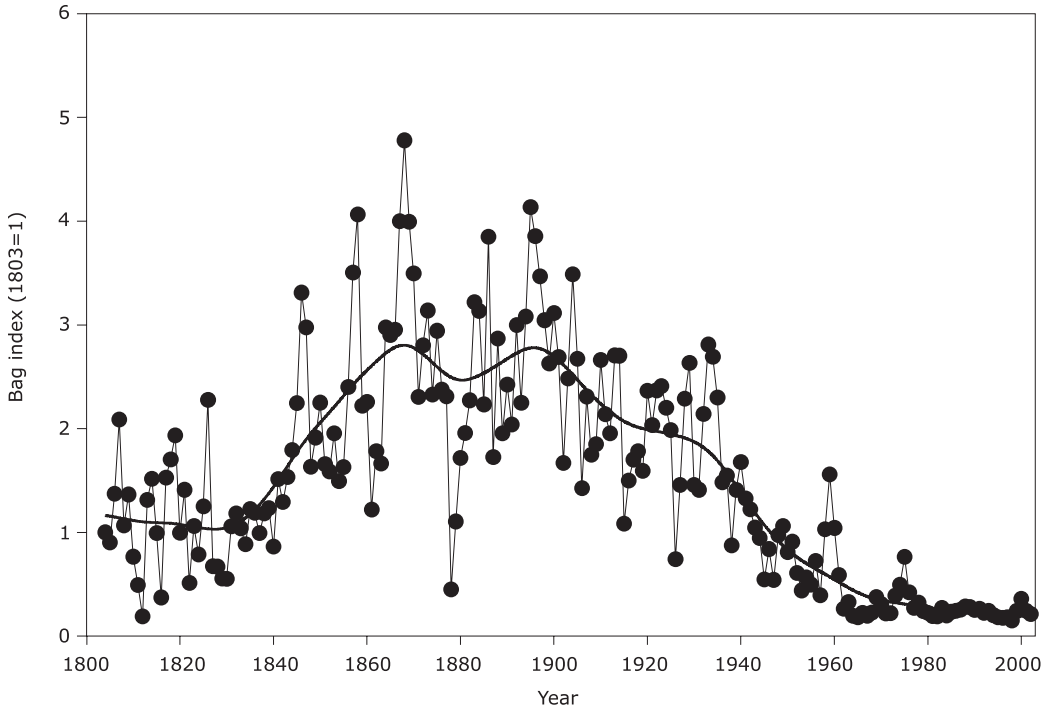

Figure 3. Grey Partridge index of bag density from the GWCT's National Gamebag Census, 1803-2002 (data from 1,189 estates). The thick line represents the long-term trend.
Índex de densitat de captures de Perdiu Xerra a partir de les dades del Cens Nacional de Caça 1803-2002 (dades de 1.189 finques). La línia gruixuda representa la tendència a llarg termini.

species, estates that provided one year of data only were omitted, as were years when no or nil bags were given. Historical data were particularly good for Grey Partridge, so for this species we carried out an additional analysis of bag returns from 1803 to 2002. GWCT Count Scheme data for Grey Partridge and Red Grouse were analysed in the same way, using site and year as factors and the logarithm of the area counted as offset. To maintain data consistency, PCS sites acquired as part of the recent expansion were not included in the analysis. All analyses were carried out using Genstat 7.1 (Numerical Algorithms Group, Oxford, UK).

Results

Trends from the National Gamebag Census

We report below the trends over the whole of the last century for Grey Partridge, Red Grouse, Black Grouse, Snipe and Woodcock. For all species we report the total number of estates contributing data during that period, and, for illustrative purposes, we give the number of estates contributing data in each year for Grey Partridge.

Grey Partridge

Between 1900 and 2002, a total of 1,180 estates provided data on Grey Partridge bags. Despite strong fluctuations, average bag density remained high until the Second World War, fell by around two-thirds until the early 1960s, then collapsed (Figure 1). This pattern corresponds to the well-known decline of the Grey Partridge described by Potts (1986), whereby partridge management was only partially resumed after World War II, and the introduction of herbicides in the 1950s disrupted the partridge food chain. The number of estates contributing data in any one year was over 100 in all years except those corresponding to the

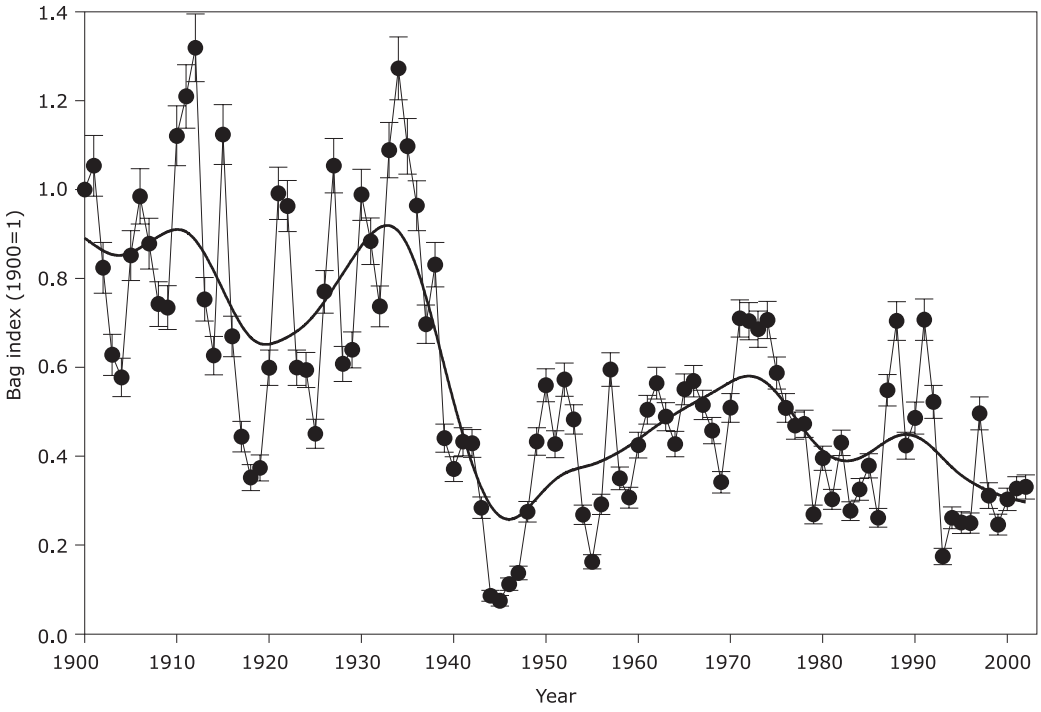

Figure 4. Red Grouse index of bag density from the GWCT's National Gamebag Census, 1900-2002 (data from 495 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de captures de la Perdiu d'Escòcia a partir de les dades del Cens Nacional de Caça 1900-2002 (dades de 495 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s .

Second World War (minimum 86 in 1944), but was as high as 572 in 1961 (Figure 2). The relatively steep decline in numbers of contributing estates since 1961 matches the decline of the Grey Partridge, and in all likelihood results from the cessation of Grey Partridge shooting as the bird's numbers dwindled.

To put the changes in bag density into historical context, Figure 3 shows how the index changed since 1803. Although data were available for fewer than 20 estates before 1860, the pattern of change over the two centuries corresponds well to what is known about the rise and fall of the Grey Partridge as a gamebird in the UK (Tapper 1992, Holloway 1996). During the 19th century, the agricultural revolution led to an increase in the arable habitats favoured by partridges, land enclosure provided hedgerows and hence nesting habitat, and predator eradication reduced mortality. As a result, numbers of partridges soared, and partridge management for shooting became widespread. Nevertheless, bag density at the end of the 20th century fell far below that at the start of the 19th century.

Red Grouse

Between 1900 and 2002, a total of 495 estates provided data on Red Grouse bags. The bags exhibit strong fluctuations from year to year, but nevertheless there is a clear trend of high bags up to the Second World War, a collapse in numbers shot during the War itself, followed by a partial recovery until the early 1970s, then a further decline over thirty years that is of the order of -40% (Figure 4). This pattern reflects the intensive moorland management for grouse carried out by the Victorians and Edwardians, which involved predator eradication and rotational heather burning to produce a patchwork of small areas with heather growth of different ages. Grouse management was largely abandoned during World War II, but recovered under a push for moorland restoration; from the

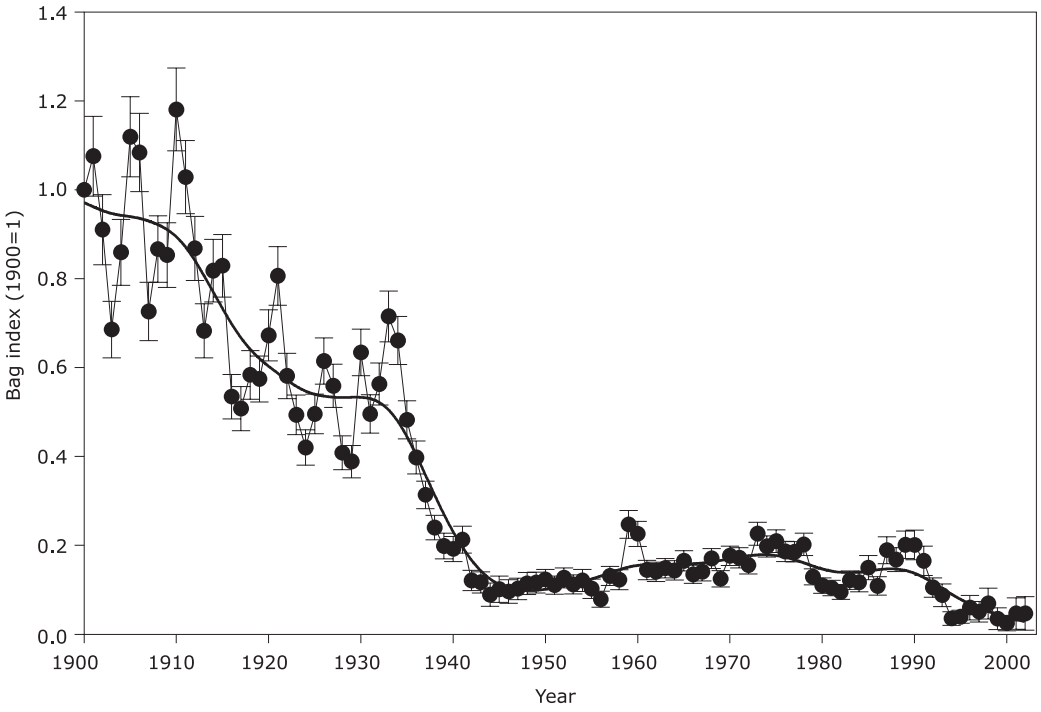

Figure 5. Black Grouse index of bag density from the GWCT's National Gamebag Census, 1900-2002 (data from 215 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de captures del Gall de Cua Forcada a partir de les dades del Cens Nacional de Caça 1900-2002 (dades de 215 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s .

mid-1970s, however, increasing pressure from overgrazing, afforestation and predators negatively influenced grouse abundance and bags (Tapper 1992, Holloway 1996).

Black Grouse

Between 1900 and 2002, a total of 215 estates provided data on Black Grouse bags. The bags show a massive decline, starting already during the First World War, then collapsing almost completely just before and during the Second World War (Figure 5). It is thought that the decline began as farming gradually improved on the moorland fringes (Tapper 1992). The collapse during World War II may reflect the intensification of farming during the War coupled with the abandonment of Red Grouse management on moorland. Since then, although young forestry plantations have provided temporary habitat, overgrazing by sheep and deer exacerbated by predation is probably responsible for the lack of recovery (Baines 1996).

Snipe

Between 1900 and 2002, a total of 1,029 estates provided data on Snipe bags. Bags are derived primarily from wintering birds, and evidence from ringing indicates that the vast majority of birds wintering in the UK come from northern and eastern continental Europe (Wernham *et al.* 2002). The general trend is for an increase up to the Second World War, albeit with a dip corresponding to the First World War, followed by a collapse and ongoing decline throughout the second half of the 20th century (Figure 6). This pattern is the inverse of profitable farming and the land drainage and cultivation that went with it (Tapper 1992). As a result of the loss of wetlands and damp meadows, it seems that the UK now has very limited appeal to wintering Snipe.

Woodcock

Between 1900 and 2002, a total of 1,290 estates provided data on Woodcock bags. The

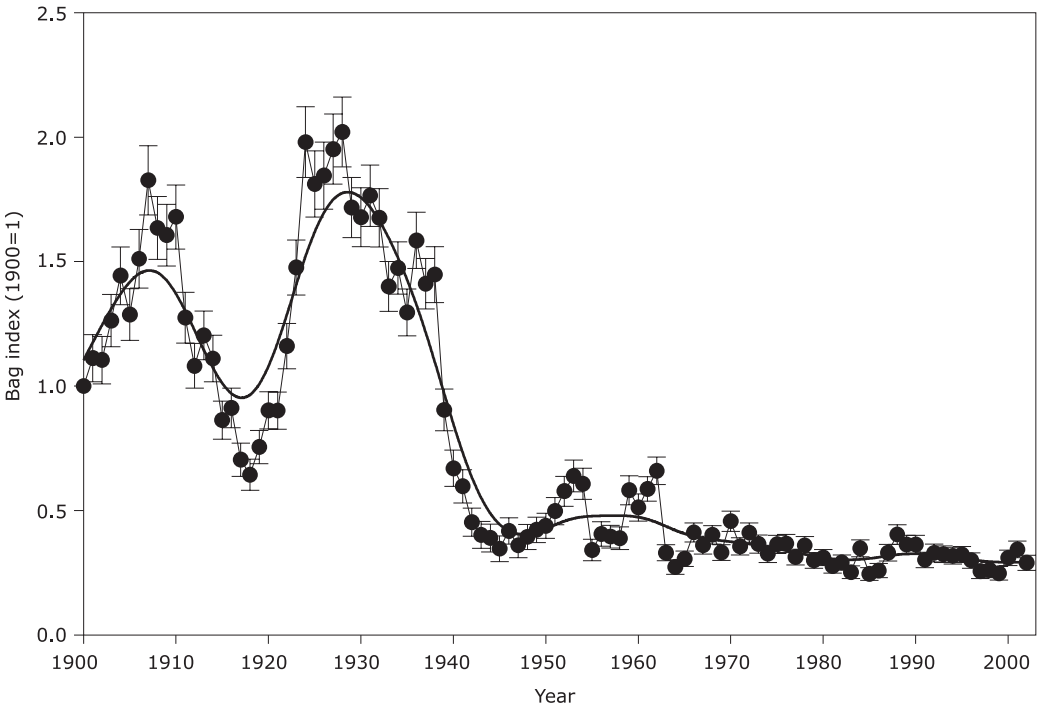

Figure 6. Snipe index of bag density from the GWCT's National Gamebag Census, 1900-2002 (data from 1,029 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de captures de Becadell Comú a partir de les dades del Cens Nacional de Caça 1900-2002 (dades de 1.029 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

Woodcock season opens on 1 October, so Woodcocks that are shot are wintering birds. Ringing recoveries suggest that 86% of wintering birds come from Fennoscandia, the Baltic States and Russia, with the remaining 14% being local (Hoodless & Coulson, 1994). The trends in bag density for this species are very different from those of the other species presented here, as the average bag density during the last 30 years of the 20th century is very similar to, or even higher than, that during the first 30 years (Figure 7). Together with evidence that shooting pressure has declined (Henderson *et al.* 1993), this suggests that the status of Woodcock in Europe has changed little over the last century.

Trends from the GWCT Count Schemes

In addition to the bag data presented above, we present long-term trends from the start of data collection under the GWCT Count Schemes for spring densities of Grey Partridge and Red Grouse. To illustrate how the count schemes also measure productivity, we give Grey Partridge chick survival rates calculated from brood sizes (Potts 1980, Potts & Aebischer 1995).

Grey Partridge

Since 1950, a total of 257 PCS estates have contributed data on Grey Partridge spring pair density. The index of abundance shows an ongoing decline after the early 1960s, with densities over the last four years averaging only 15% of the densities recorded up to 1963 (Figure 8). This difference matches the -86% change between 1967 and 2000 reported from the BTO's Common Birds Census and Breeding Bird Survey (Crick *et al.* 2004).

PCS data on chick survival rates are available already from 1933 (Potts 1980), and the long-term trend shows that they remained high until 1950, then gradually declined to a level roughly a third lower than the original one (Figure 9). Potts (1980, 1986) ascribes the change

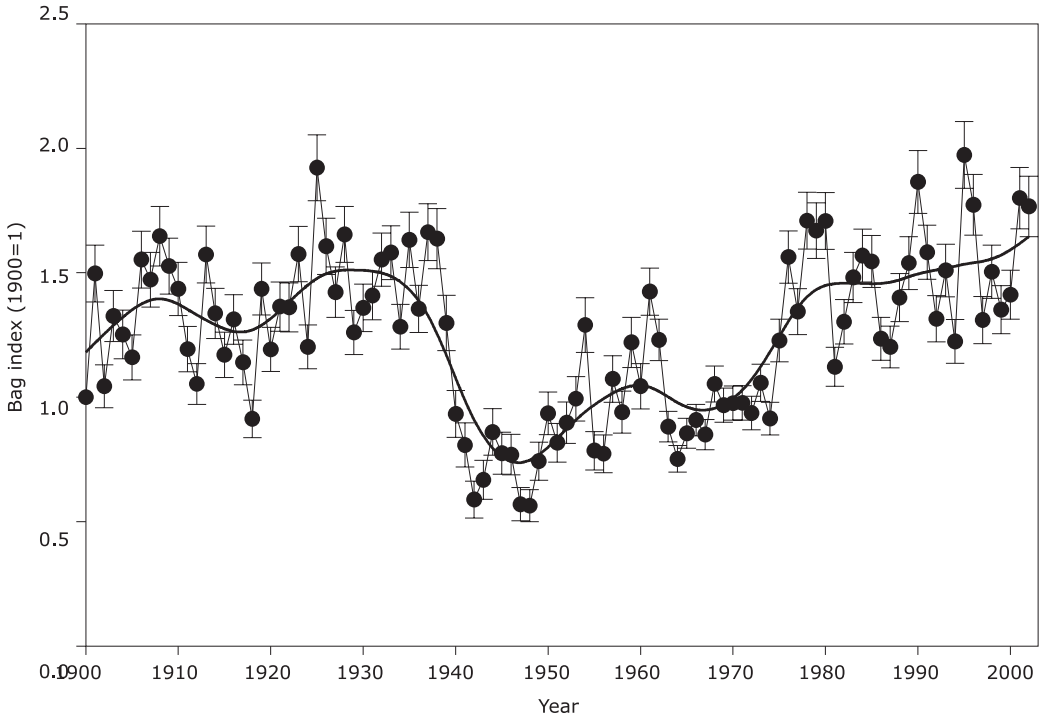

Figure 7. Woodcock index of bag density from the GWCT's National Gamebag Census, 1900-2002 (data from 1,290 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de captures de Becada a partir de les dades del Cens Nacional de Caça 1900-2002 (dades de 1.290 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

in chick survival rate to the use of herbicides on cereals; this destroyed the weedy understorey that supports the invertebrates that chicks eat and depend on for survival during the first two weeks of life.

Red Grouse

Red Grouse counts were initiated in 1971, since when spring density has been measured on a total of 166 sites. There has been no detectable long-term trend in spring density over the 32 years covered by the count scheme (Figure 10).

Relevance and representativeness of GWCT datasets

Being based on numbers of birds shot, the trends from the NGC may reflect hunting effort rather then species abundance. Likewise, neither the NGC estates nor the GWCT Count Scheme sites have been chosen at random, so the trends that they express may not be representative of the national picture. Although a detailed consideration of these issues is beyond the scope of this paper, we present below information on both aspects that suggests that, in some cases at least, the problems of interpretation that they imply are minor.

Do bags measure abundance?

This issue was examined by Hudson (1992) in the case of Red Grouse. He showed that, on a logarithmic scale, there was a linear relationship between the density of birds present in August and the number shot per unit area such that August density explained 60% of the variation in number shot (Figure 11). The implication is therefore that grouse bags may be successfully used as a surrogate measure of grouse abundance.

How representative are the data?

Potts (1986) showed that Grey Partridge chick survival rate was a key factor *sensu* Varley &

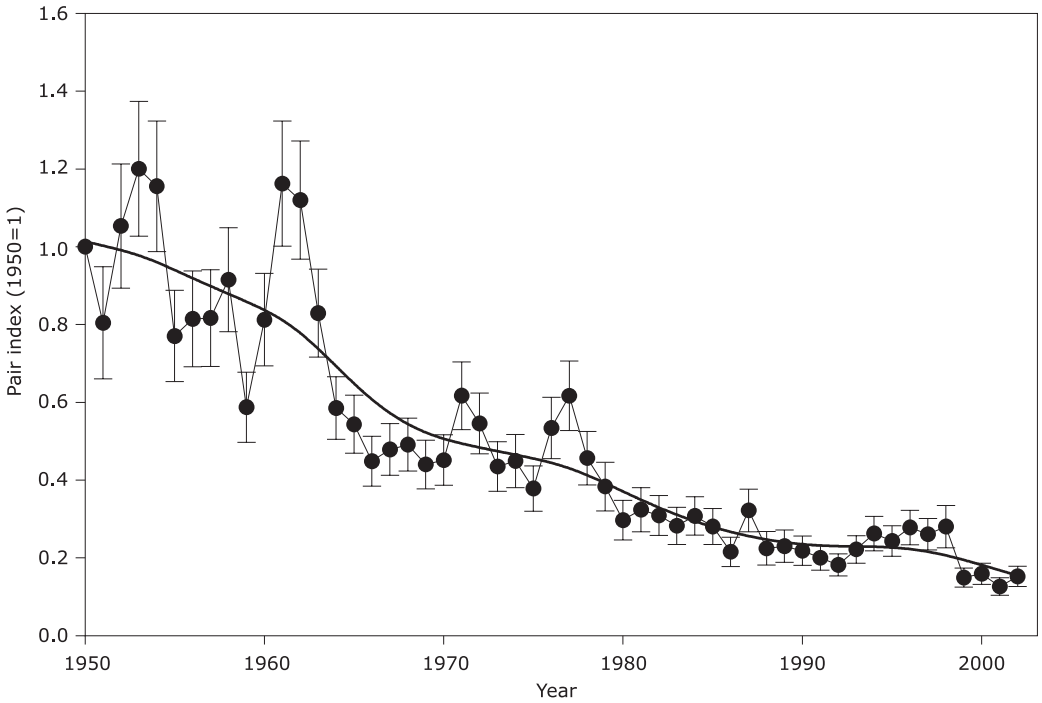

Figure 8. Grey Partridge index of pair density from the GWCT's Partridge Count Scheme, 1950-2002 (data from 257 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat de parelles de Perdiu Xerra a partir de les dades del Programa de Cens de Perdius (PCS), 1950-2002 (dades de 257 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

Gradwell (1963). If the PCS data were representative, it would be expected that annual chick survival rates calculated from the PCS would tally with an independent measure of Grey Partridge annual population change. Using population change measured by the BTO's Common Birds Census, Aebischer & Ewald (2004) demonstrated that, indeed, the annual change in Grey Partridge abundance was closely related to PCS chick survival rates (68% of variation explained; Figure 12). For this species, it seems clear that the PCS provides adequate national representation.

Discussion and conclusion

The existence of the NGC and of the GWCT's Count Schemes is probably one of the best-kept secrets in the UK. The aim of this paper is to draw attention to the existence of these GWCT datasets, which in many ways complement other widely quoted datasets such as those held by the BTO. The NGC, for instance, provides a historical context and a long-term view spanning at least a century for most game species. Indeed, as shown in Figure 3, the span is of two centuries for the Grey Partridge. This revealed that the ongoing decline since the Second World War was only part of the picture, that there had been large-scale increases during the course of the 19th century, but that nevertheless current levels are much lower than levels at the start of the 19th century. Data on Grey Partridge productivity, from the PCS, extend back 70 years, and clearly demonstrate the change that has taken place in chick survival rate with the intensification of agriculture in the 1950s. As chick survival is a key factor in determining population change (Figure 12), being able to measure it over such a long period is invaluable when seeking to identify causes of decline (Potts 1980, Potts 1986). The only other UK bird survey that approaches similar lengths of time is the BTO's

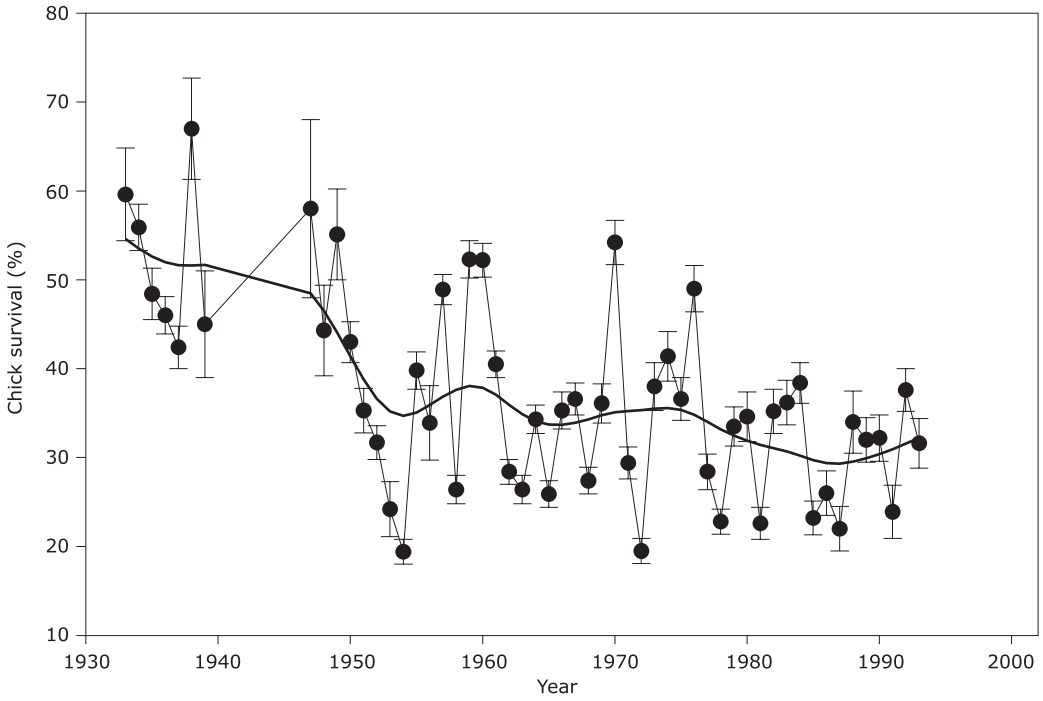

Figure 9. Grey Partridge chick survival rates from the GWCT's Partridge Count Scheme, 1933-2002 (Potts 1980, Potts & Aebischer 1995). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de supervivència de polls de Perdiu Xerra a partir de les dades del Programa de Cens de Perdius (PCS), 1933-2002 (Potts 1980, Potts & Aebischer 1995). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

Heronries Census, which began in 1928; other national bird monitoring schemes did not start until the 1960s (Marchant *et al.* 1990).

Another way in which the GWCT datasets complement other bird monitoring schemes is in the range of species that are covered. Of the three sedentary gamebird species presented here, Red and Black Grouse were not recorded as part of the BTO's Common Birds Census, and the Grey Partridge was recorded on a maximum of 73 plots in any one year (Marchant *et al.* 1990). By comparison, over 100 NGC estates provided data on Grey Partridge bags in all years except during the Second World War, and the maximum exceeded 500 (Figure 2). Since 1994, all three species are covered by the BTO's Breeding Bird Survey, although the number of squares in which they are recorded is less than 10% of the total, and Black Grouse was present in only four squares in 2003 (Raven *et al.* 2004). The Woodcock and the Snipe are notoriously difficult to monitor because of their secretive habits, yet in the NGC numbers shot have been recorded on over 1,000 estates during the last century. A direct comparison between the NGC and other national schemes is not possible for these species because the NGC samples the wintering population, which originates mainly from Fennoscandia, the Baltic States and Russia (Hoodless & Coulson 1994), rather than the breeding population. Nevertheless, the results for Woodcock, which indicated that bag density at the end of the 20th century was similar to bag density at its start, suggest that its unfavourable conservation status in Europe (Tucker & Heath 1994, Heath *et al.* 2000) may need revising.

One potential problem with the interpretation of trends from bag statistics is that they reflect shooting effort as well as species abundance. If shooting pressure changes over time, so too will the trend in the index of bag density,

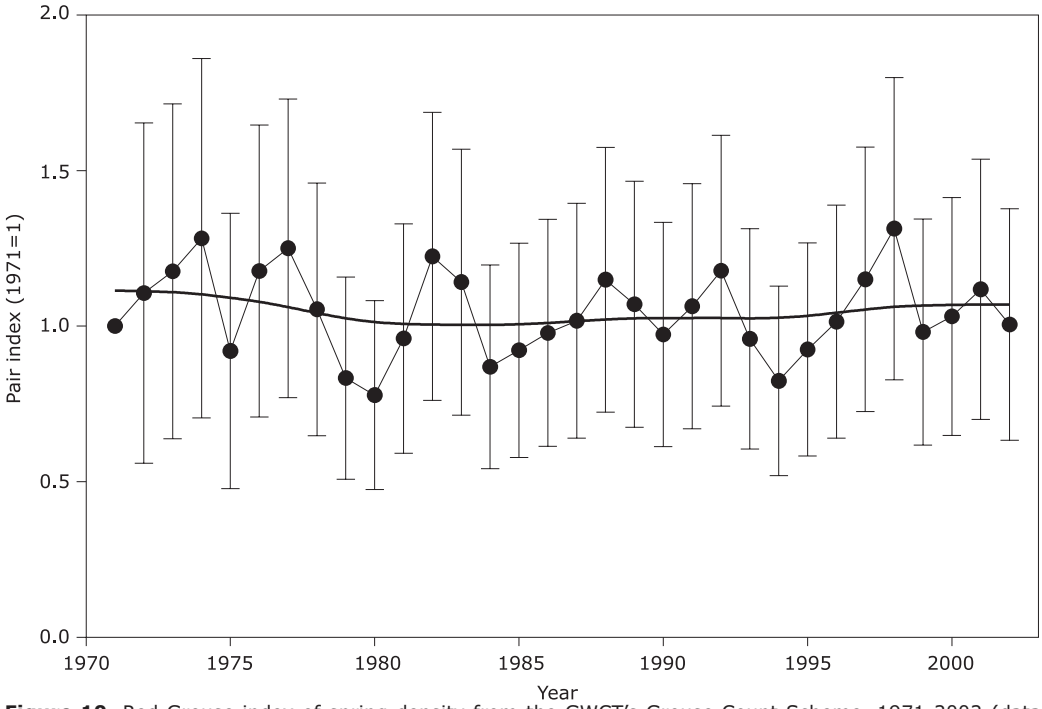

Figure 10. Red Grouse index of spring density from the GWCT's Grouse Count Scheme, 1971-2002 (data from 166 estates). The thick line represents the long-term trend, while the error bars indicate ± 1 s.e.
Índex de densitat primaveral de Perdiu d'Escòcia a partir de les dades del Programa de Cens de Perdius de muntanya (GCS), 1971-2002 (dades de 166 finques). La línia gruixuda representa la tendència a llarg termini i les barres indiquen ± 1 e.s.

even if abundance remains constant. Although changes in the number of shooters in the UK remains poorly known (most recently estimated at 750,000 in 1990 – Harradine 1992), the system of game ownership, whereby game belongs to the owner of the land where it is found, and the tradition of driven shooting have remained constant for at least 200 years (Tapper 1992). These factors, far more than the number of shooters, will determine shooting pressure. Where the data exist to link bag statistics to gamebird density, as in the case of the Red Grouse (Figure 11; Hudson 1992), the relationship between the two appears good. This has been confirmed with more sophisticated analyses by Cattadori *et al.* (2003). A recent examination of the NGC data on mammalian game found that for species covered by other monitoring schemes, such as Rabbit *Oryctolagus cuniculus*, there was a good match between trends in annual population indices (Whitlock *et al.* 2003). It would appear, therefore, that population indices of huntable species derived from bags are influenced relatively little by shooting effort, which is encouraging.

Another potential problem with the GWCT long-term datasets is that the estates and sites that contribute records, either bags or counts, have not been chosen at random within the countryside, and so the trends generated from them may not reflect national population trends. We believe that this is certainly an issue with the Red Grouse counts, which, because of their intensive nature, are concentrated on only a small number of core sites corresponding to well-managed grouse moors. This would explain why the downward trend apparent in the index of bag density since 1970 (Figure 4) is absent from the count index (Figure 10). The bags themselves come from estates with a much broader geographical coverage than the counts, equivalent to over a third of overall grouse moorland in the UK (Hudson 1992). This range includes estates where grouse were shot historically, but

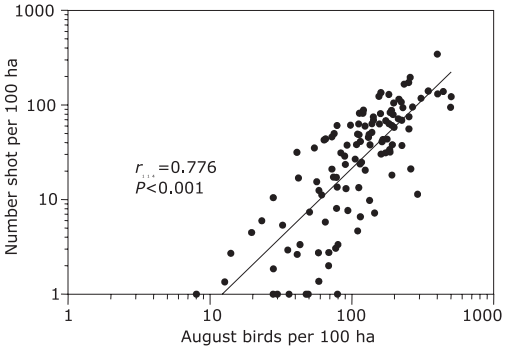

Figure 11. Red Grouse annual bag density in relation to the annual density of Red Grouse in August (source: Hudson 1992).
Densitat anual de captures de Perdiu d'Escòcia en relació a la densitat anual de perdius d'Escòcia durant el mes d'agost (font: Hudson 1992).

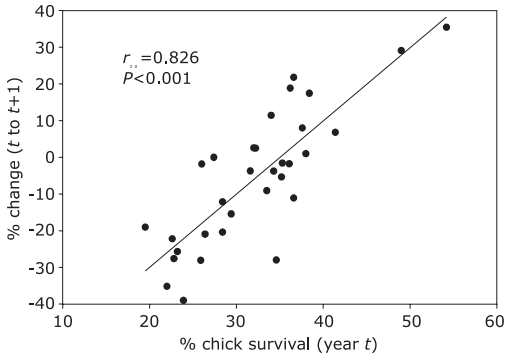

Figure 12. Grey Partridge annual population change (from the BTO's Common Birds Census) in relation to productivity, measured as annual chick survival rates from the GWCT's Partridge Count Scheme.
Canvi anual de població de Perdiu Xerra (a partir del Programa de Cens d'Ocells Comuns de la BTO) en relació a la productivitat, mesurada com a supervivència anual de polls a partir de les dades del Programa de Cens de Perdius (PCS).

where densities are now too low for shooting to take place, so is likely to capture much of the genuine variation in the UK Red Grouse population. A similarly broad coverage exists for lowland estates, of which over 1,000 have contributed bags to the NGC, and over 250 have contributed counts to the PCS. Indeed, the strong relationship between annual productivity and population change of the Grey Partridge in the UK measured using independent datasets (Figure 12) gives reassurance that these counts embody the changes that have taken place in the wider countryside (Aebischer & Ewald 2004).

In conclusion, we believe that the potential problems of interpretation associated with the NGC and GWCT count schemes are, in most cases, relatively minor. The GWCT long-term datasets provide an invaluable window into the past, and usefully complement other UK bird monitoring schemes for the present and the future.

Acknowledgements

Without the kind and dedicated participation of keepers, farmers and landowners who have provided returns over all these years, neither the National Gamebag Census nor the Partridge Count Scheme would exist: we are most grateful to them all. We thank also all members of GWCT staff who have been responsible for setting up and maintaining the schemes as well as collecting data for them.

Resum

El seguiment de l'abundància i la productivitat dels ocells cinegètics al Regne Unit: Les bases de dades a llarg termini de la *Game & Wildlife Conservation Trust*

A causa de la importància econòmica de la caça, els propietaris de finques i els administradors de l'activitat cinegètica han estat durant molt temps interessats en el seguiment de l'abundància i la productivitat locals a través de comptatges i estadístiques de caça. El Cens Nacional de Caça (NGC) i el Programa de Cens de Perdius (PCS) de la *Game & Wildlife Conservation Trust* es van establir oficialment l'any 1961. El NGC recopila anualment estadístiques de totes les espècies cinegètiques de més de 600 finques, i la seva activitat té més de 200 anys d'història. Des de 1933, el PCS recull anualment informació sobre l'abundància i la productivitat de les perdius de les terres baixes d'unes 100 finques. El programa de cens es va ampliar el 1971 per determinar l'abundància i la productivitat dels galls de muntanya. Utilitzant aquestes dades, es presenten les tendències a llarg termini de cinc espècies d'ocells cinegètics, algunes de les quals estan mal representades en d'altres projectes de seguiment d'escala nacional. Tot i les possibles dificultats d'interpretació a causa de la mateixa pressió cinegètica i dels problemes de representativitat, les bases de dades de la *Game & Wildlife Conservation Trust* resulten d'utilitat per complementar els altres programes de seguiment d'ocells del Regne Unit.

Resumen

El seguimiento de la abundancia y la productividad de las aves cinegéticas en el Reino Unido: Las bases de datos a largo plazo de la *Game & Wildlife Conservation Trust*

Debido a la importancia económica de la caza, los propietarios de fincas y los administradores de la actividad cinegética han estado durante mucho tiempo interesados en el seguimiento de la abundancia y la productividad local a través de conteos y estadísticas de caza. El Censo Nacional de Caza (NGC) y el Programa de Censo de Perdices (PCS) de la *Game & Wildlife Conservation Trust* se estableció oficialmente en 1961. El NGC recopila anualmente estadísticas de todas las especies de caza de más de 600 fincas, y su actividad se remonta a más de 200 años. Desde 1933, el PCS recoge anualmente información sobre la abundancia y la productividad de las perdices de las tierras bajas de alrededor de 100 fincas. El programa de censo se amplió en 1971 para determinar la abundancia y la productividad de los gallos de monte. Usando estos datos, se presentan las tendencias a largo plazo de cinco especies de aves cinegéticas, algunas de las cuales están mal representadas en otros proyectos de seguimiento de escala nacional. A pesar de las posibles dificultades de interpretación debido a la propia presión cinegética y los problemas de representatividad, las bases de datos de la *Game & Wildlife Conservation Trust* resultan de utilidad para complementar a los otros programas de seguimiento de aves del Reino Unido.

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