Restoration of a sustainable wild grey partridge shoot in eastern England

R. A. H. Draycott

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Abstract

Restoration of a sustainable wild grey partridge shoot in eastern England.— Eastern England has been a stronghold for grey partridges *Perdix perdix*, but in common with the rest of Britain, numbers declined from the 1950s onwards. Partridges within a 40 km^2 study area in the county of Norfolk have been monitored in conjunction with the Game and Wildlife Conservation Trust (GWCT) since the 1950s. Since 2001 a programme of habitat creation, supplementary feeding and predation control was undertaken by the landowner, farmers and gamekeepers to restore partridges. Numbers increased from 4.7 pairs/km^2 in March 2001 to 54 pairs/km^2 in March 2011. These densities are comparable with those before the national decline in grey partridge stock. In the last three winters, between 13 and 74 birds/km^2 were harvested and spring stocks continue to increase.

Key words: Grey partridge, Habitat creation, Supplementary feeding, Predation control, Shoot.

Resumen

Recuperación de un coto de caza sostenible de perdiz pardilla en el este de Inglaterra.— El este de Inglaterra ha sido un baluarte de la perdiz pardilla, *Perdix perdix*, pero al igual que en el resto de Gran Bretaña, sus efectivos están disminuyendo desde los años cincuenta. Desde dicha década se han monitorizado las perdices de un área de estudio de 40 km^2 en el condado de Norfolk en colaboración con la GWCT (Fundación para la Conservación de la Caza y la Fauna). A partir del año 2001, terratenientes, granjeros y guardabosques emprendieron un programa de creación de hábitat, suplementación alimentaria y control de los predadores, con el fin de recuperar las perdices. Las densidades aumentaron desde 4,7 parejas/km^2 en marzo del 2001 a 54 parejas/km^2 en marzo del 2011. Dichas densidades son comparables a las que había antes de la disminución nacional de los efectivos de perdiz pardilla. Durante los últimos tres inviernos se abatieron entre 13 y 74 aves/km^2, y los efectivos primaverales continúan creciendo.

Palabras clave: Perdiz pardilla, Creación de hábitat, Alimentación suplementaria, Control de predadores, Coto de caza.

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Introduction

Historically, eastern England has been a stronghold for grey partridges *Perdix perdix*. From 1900 to 1920 between 20 and 72 birds/km^2 were shot annually on shooting estates in eastern England (Tapper, 1992). However, between 1950 and 1990 shooting bags declined by 80% owing to a long–term dramatic decline in their population and range (Aebischer & Ewald, 2004). Between 1995 and 2009 populations continued to decline with estimates of a 54% decrease across the UK (47% in eastern England) over this period (Risely et al., 2011). There have been similar declines across the rest of its natural range and it is a species of European concern (PECBMS, 2010). The causes of the decline have been well researched and are mainly related to agricultural intensification and predation (Potts, 1986). More recently, it has been shown that habitat improvement and predation control can lead to increasing numbers of grey partridges at the local level (Aebischer & Ewald, 2010). In 1995, the UK Government designated grey partridge as a priority species under its Biodiversity Action Plan (BAP). It defined three targets for recovery: 1) to halt the decline by 2005; 2) to ensure the population is above 150,000 pairs by 2010; and 3) to enhance the current range. The aim of this paper is to describe the work undertaken by a large, privately–owned arable farming estate to restore wild grey partridges in an area where they were previously abundant.

Methods

Study area

The restoration project consisted of approximately 40 km^2 of farmland in the county of Norfolk in England. The study area is owned by one landowner, but includes some areas farmed by the landowner and other areas farmed by tenants. The study area was divided into five different game management units (beats), with gamebird management undertaken by one gamekeeper on each beat. The landscape is dominated by arable crop production, comprising winter and spring sown cereals (mainly wheat and barley), sugarbeet, oil–seed rape, peas (vining and combinable), potatoes and parsnips. These crops are typical of the region. Most fields are surrounded by hedgerows and grassy hedgebanks, (comprising approximately 2.5% of the land area) which are the favoured nest site for grey partridges in arable landscapes (Rands, 1986). There is a network of small woodlands, comprising 4.5% of the study area. Gamekeepers are employed on the estate to undertake predation control, habitat management and supplementary feeding. In addition to grey partridges, the study area is also managed to encourage wild pheasants (*Phasianus colchicus*), red–legged partridges (*Alectoris rufa*) and brown hare (*Lepus europaeus*).

Habitat management

The recovery project is based on three key requirements of grey partridges: 1) provision of suitable habitat for all aspects of the life history of the grey partridge; 2) protection from nest predators; and 3) provision of supplementary feed in winter and spring. Before set–side was abolished, it was utilised to provide habitat for partridges. Today, partridge habitat is provided via a combination of five or ten year environmental stewardship agreements, funded under the EU Common Agricultural Policy. Additional areas of habitat are privately funded by the landowner. These include grass margins (comprising 1.4% of the land area) to provide nesting cover, wild bird seed covers to provide winter cover and food and insect rich brood–rearing cover (comprising 3% of the land area). Wild seed mixtures are based on annual or biennial mixtures including cereals and brassicas. Brood rearing cover is sown close to nesting areas and consists of low input, spring sown cereal strips or perennial mixtures including chicory (*Chicorium* sp.) and lucerne (*Medicago sativa*). The structure of brood rearing cover is very important. Grey partridges will only use brood rearing areas if they feel safe, and if they can move freely through the vegetation. Therefore brood rearing cover should provide both an overhead canopy for protection from predators and an open structure at the base to allow freedom of movement (Sotherton & Swan, 2001).

Predation control

Common predators such as foxes (*Vulpes vulpes*), crow (*Corvus corone*), magpie (*Pica pica*) stoats (*Mustela erminea*) and rats (*Rattus norvegicus*) were controlled to reduce predation on adults, nests and broods in order to improve breeding success and population density of gamebirds (Tapper et al., 1996). Only predators which can be legally controlled were targeted, and gamekeepers adhered to all legal requirements, guidelines and codes of practice. Fox control consisted of night–time shooting and snaring, and corvids were shot or trapped using live catch Larsen traps. A network of tunnel traps were used to control small mammalian nest predators (*e.g.* brown rats and stoats).

Supplementary feeding

Although it has not been scientifically proven that spring supplementary feeding benefits grey partridges, there is scientific evidence that it benefits pheasants on farmland in Britain (Draycott et al., 1998; Draycott et al, 2005). Draycott et al. (1998) showed that it leads to improved body condition in nesting females, and Draycott et al. (2005) documented increases in breeding densities and improved recruitment in the autumn. In particular, hen pheasants with access to supplementary grain were much more likely to re–nest than unfed hens if their first nest was unsuccessful. Also, Hoodless et al. (2001) showed that pheasants provided supplementary grain spent much less time actively foraging for food than unfed hens. This could confer survival benefits for pheasants and partridges as less time spent feeding implies more time being vigilant. Supplementary feeding is provided for grey partridge from October or November (start date is dependent on environmental conditions) until the end of May. Feed hoppers are lo-

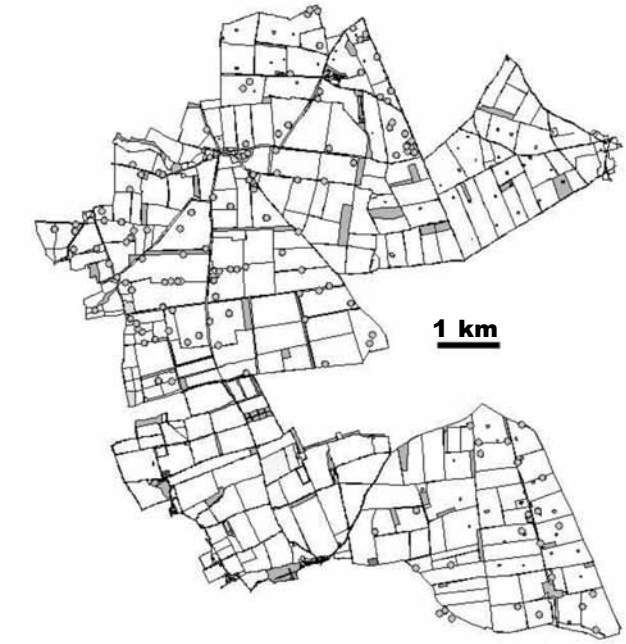

Fig. 1. Location of breeding pairs of grey partridges (grey dots) on 40 km^2 study area in Norfolk, England in 2000, prior to the recovery project.

Fig. 1. Localización de las parejas de cría de perdiz pardilla (puntos grises) en un área de estudio de 40 km^2 en Norfolk, Inglaterra, en el 2000, antes del proyecto de recuperación.

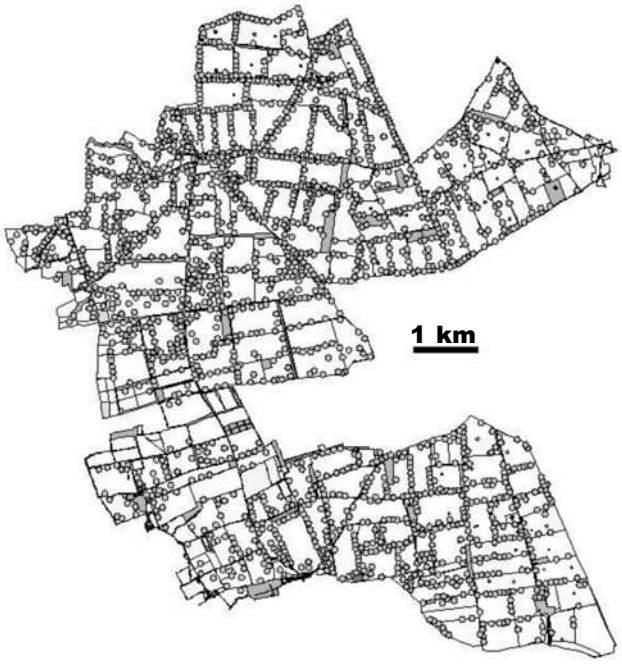

Fig. 2. Location of breeding pairs of grey partridges (grey dots) on 40 km^2 study area in Norfolk, England in 2011.

Fig. 2. Localización de las parejas de cría de perdiz pardilla (puntos grises) en un área de estudio de 40 km^2 en Norfolk, Inglaterra, en el 2011.

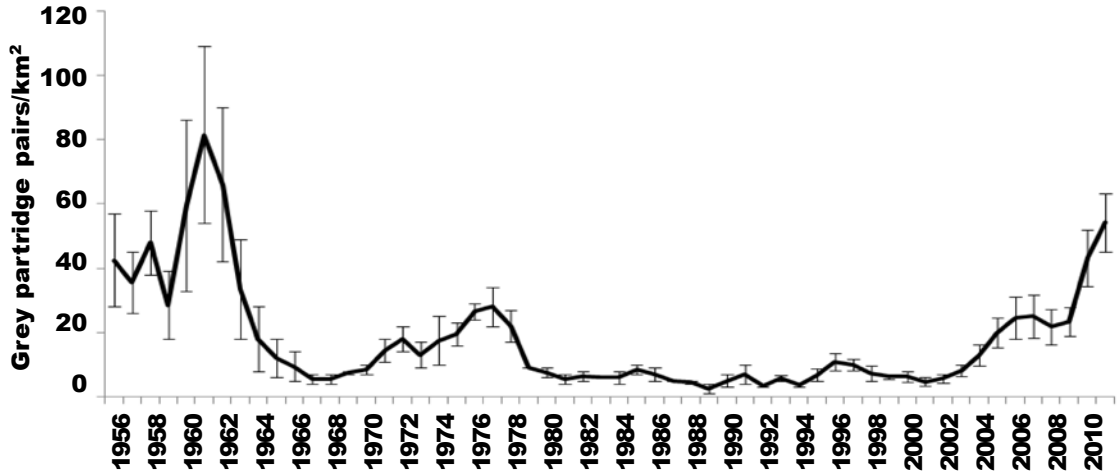

Fig. 3. The mean ± SE densities of breeding pairs of grey partridge on an estate in Norfolk, England 1956–2011.

Fig. 3. Densidades medias ± EE de las parejas de cría de perdiz pardilla en un coto de caza del estado de Norfolk, Inglaterra, 1956–2011.

cated approximately 75 m apart along hedgerows and beetle banks; the aim being to provide one hopper for every grey partridge territory. Draycott & Palmer (2008) showed that grey partridges tend to set up territories along hedgerows close to feed hoppers and that there was a positive relationship between pair density and the amount of hedgerow in the landscape.

Monitoring

Population counts have been undertaken on the study site by the gamekeepers in conjunction with the GWCT since the 1950s. In March, all fields are surveyed with binoculars using a 4WD vehicle during the early morning or the evening (Potts, 1986). The location of

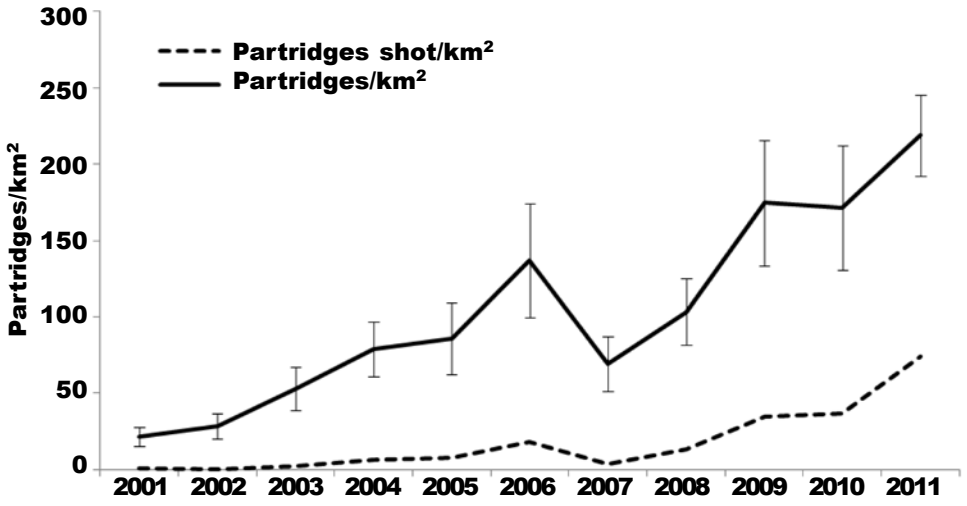

Fig. 4. The mean ± SE densities of partridges in autumn (solid line) and densities shot (dashed line) on an estate in Norfolk, England 2001–2011.

Fig. 4. Densidades medias ± EE de perdices en otoño (línea continua) y densidades cazadas (línea de puntos) en un coto de caza del estado de Norfolk, Inglaterra, 2001–2011.

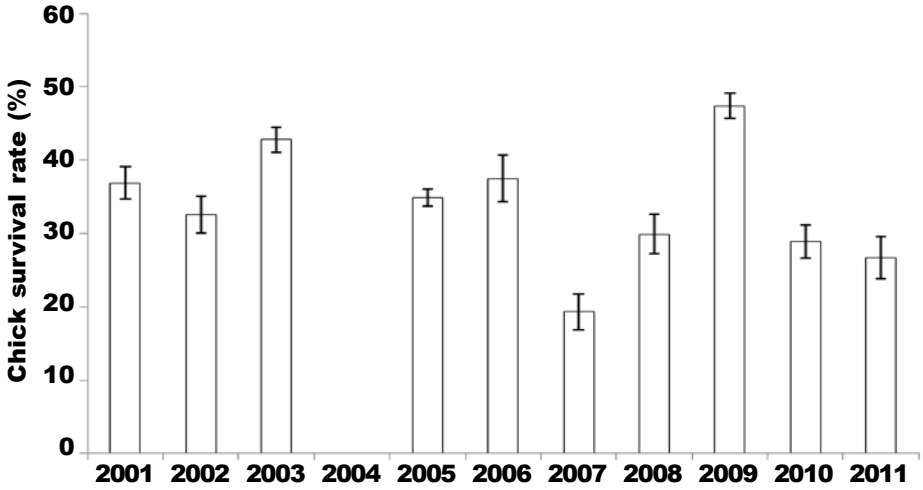

Fig. 5. The mean (± SE) chick survival rate of grey partridges on an an estate in Norfolk, England 2001–2011. Note: data missing for 2004.

Fig. 5. Tasa de media (± EE) de supervivencia de crías de perdiz pardilla en un coto de caza del estado de Norfolk, Inglaterra, 2002–2011. No existen datos del año 2004.

observed breeding pairs and single birds is marked on a map. In recent years these have subsequently been entered into a GIS software package (figs. 1, 2). In the autumn, after harvest of most arable crops, all fields are re–surveyed. All coveys are counted, and the age of individuals (adult or juvenile) and the sex of the adult birds is recorded. All counts since 1999 were undertaken by the author, thereby removing any possibility of observer bias over the duration of the project (2001–2011). Each partridge beat (n = 5) was counted separately and numbers presented are mean values ± 1 SE.

Results

Response of grey partridges

Numbers of grey partridges have increased dramatically during the course of the restoration period from (mean ± se) 4.7 ± 1.3 pairs/km^2 in March 2001 to 54.2 ± 9.1 pairs/km^2 in March 2011 (fig. 3). The estimated current average spring pair density on farms in Norfolk where intensive partridge management is not undertaken is 3.5 pairs/km^2 (N. Kingdon, pers. com). In the highest density beat there were 88 pairs/km^2 in March 2011. In autumn, densities of greys have increased from 21.4 ± 6.2 birds/km^2 in 2001 to 218.8 ± 26.8 birds/km^2 in 2011 (fig. 4). The autumn figures are probably underestimates as approximately 25% of the study area cannot be counted in autumn due to crops (*e.g.* sugarbeet) still being present in the fields in September. However, figures are not adjusted to account for this as it is not known if partridges use this habitat in proportion to its availability. Between 2001 and 2011 mean chick survival rate (calculated according to Aebischer & Reitz, 2000) was 33.7 ± 2.6 (fig. 5). Mean brood production rate (Aebischer & Reitz, 2000) between 2001 and 2011 was 89.9 ± 3.0%. In 2011, 74 partridges/km^2 were harvested in the autumn.

Discussion

Under intensive, modern arable farming systems with no provision of brood rearing cover, chick survival rate is typically close to 20% (Aebischer & Ewald, 2004). Average chick survival rate over the course of the study was 33%, indicating that the provision of insect foraging areas has likely had a positive effect on chick survival rate. Mean brood production rate between 2001 and 2011 was 89.9 ± 3.0%, indicating low rates of nest predation owing to effective control of nest predators (Potts & Aebischer, 1991).

In contrast to the rapid increase in numbers on this estate where intensive grey partridge management has been undertaken, on farms in England where no specific grey partridge conservation work is undertaken, grey partridges declined by 30% between 1999 and 2009 (Renwick et al., 2012). Other farms and estates that have undertaken management to restore partridges have also recorded increases in grey partridge numbers. For example, the GWCT Partridge Recovery Project at Royston in eastern England recorded a six–fold increase in numbers within five years, from 3 pairs/km^2 in 2002 to 18 pairs/km^2 in 2007 (Aebischer & Ewald 2010), and contributors to the GWCT Partridge Count Scheme have, on average, doubled the numbers of pairs

counted between 2001 and 2010. (Aebischer & Ewald, 2010). Between 2008 and 2010 a maximum of 30% of the autumn stock was harvested on the study area (fig. 4). This is clearly within sustainable limits as the spring breeding stock continues to increase. The current density of grey partridges is the highest recorded with a modern commercial farming system (post–agricultural intensification) in the UK. It is therefore difficult to predict the optimum sustainable yield or, indeed, the carrying capacity of the land. However, Potts & Aebischer (1991) predicted through modelling an equilibrium density of 64 breeding pairs/km^2 when nesting cover and chick food were not limiting factors and when nest predation rates were low. These results highlight the important role of private land managers in effective conservation of a declining species at the local level. The challenge is to translate these successes into partridge recovery at regional and national scales.

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