Grey partridges are an "indicator species" for broader farmland biodiversity, because where they thrive, a range of other species tend to do well. © Markus Jenny

3. Grey partridge

In the past, the wild grey partridge thrived on farmland, and was traditionally the main focus of shooting in the lowlands. Management for driven partridge shooting led to rising numbers during the 19th century; it involved comprehensive predator control in a farmed environment that provided good partridge habitat, with weedy cereal crops, traditional crop rotations including grass crops, small fields separated by hedges, fallows and waste ground. By contrast, grey partridge numbers have been falling in the UK throughout the second half of the 20th century, with the decline becoming most marked since the mid-1960s. To focus conservation efforts, the grey partridge was put on the UK Red Data List in 1990, became a priority species under the 1995 UK Biodiversity Action Plan[36], and remains a red-listed Bird of Conservation Concern. Progress has been made in areas that make a commitment to partridge conservation, but overall the decline in their numbers continues.

GWCT research on grey partridge declines in the 1960s and 1970s helped to establish the new field of agro-ecology, which is studying

ecology within farming systems. Scientific study moved from recording declines, to investigating the changes in the arable environment that were affecting partridges[45–47]. This work found that the causes of the grey partridge decline were directly or indirectly related to much wider declines in many aspects of farmland biodiversity. For instance, the UK government monitors national bird abundance through the British Trust for Ornithology's Breeding Bird Survey, which has shown a 92% decline in numbers of grey partridge from 1967 to 2015, in conjunction with declines in many other species of farmland bird[48].

Several conservation measures developed with partridges in mind have been incorporated into agri-environment schemes. © Peter Thompson

Why is the wild grey partridge so important?

Although the grey partridge now makes up a much smaller component of the bag than it used to, and relatively few people may ever go to a grey partridge shoot, it is a very important species in both the history of shooting, and the evolution of game management techniques. It is our native gamebird, and forms part of shooting's heritage. The grey partridge population is declining, and focused conservation efforts are needed if we are to recover the population, but there is also a wider relevance for grey partridge conservation.

Grey partridges are an "indicator species" for broader farmland biodiversity, because where they thrive, other species tend to do well, and where they are declining, other species also tend to struggle. Partridge declines are mirrored by declining numbers of many other farmland bird species, and introducing partridge conservation measures often leads to wider biodiversity benefits. For example,

areas which are managed with partridge-friendly techniques such as conservation headlands can also have higher numbers of songbirds[39,49], butterflies[50,51] and rare arable plants[52,53]. Because of this, the partridge has been labelled the "Barometer of the Countryside"[39].

Furthermore, because of GWCT research into grey partridge declines and how we might help this species, several conservation measures developed with grey partridge in mind, such as beetle banks and conservation headlands, have been incorporated into agri-environment schemes in the UK. The fact that financial support is available for these conservation techniques means that they are likely to be more widespread across the countryside, benefiting more gamebirds and wildlife.

How have grey partridge numbers changed?

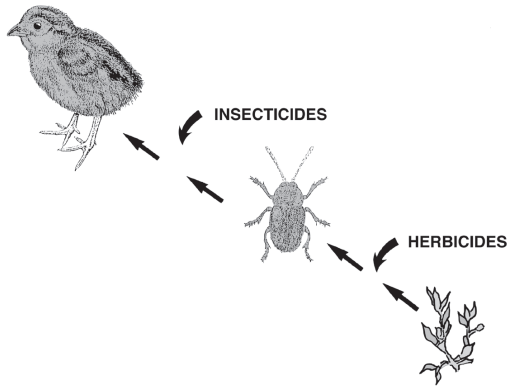
In the last two hundred years the grey partridge population in the UK shows four distinct trends in different periods. These reflect changes in management of predators and of the wider countryside: early 1800s to late 1800s, an increase in numbers; late 1800s to pre-1950s, generally high numbers; 1950-1970, sharp decline in numbers; and after 1970, a continued gradual decline[39,54,55].

Why has this decline happened?

The 1950s saw the widespread introduction of herbicides in arable farming, which eliminated arable weeds from crops and reduced the abundance of invertebrates that live on those weeds. As grey partridge chicks depend on invertebrates for their survival during the first two weeks of life, and as in arable areas the chicks forage primarily in cereal crops, this was a major disruption to the grey partridge food chain (see Figure 3 overleaf)[56].

Grey partridge chick survival, which averaged 49% before the introduction of herbicides, dropped to 32% on average once their use became widespread[54]. In the 1980s, the use of summer insecticide treatments on cereal crops also became more frequent, which reduced the abundance of chick-food invertebrates in those crops even further[57,58]. Also from the 1950s onwards, the increasing mechanisation of agriculture led to the removal of hedgerows and other field boundaries to make fields bigger and farming more efficient, which meant a loss of nesting cover for grey partridges[45,46].

Figure 3: The grey partridge food chain



The third cause of the decline is increased predation pressure from generalist predators such as fox, stoat, weasel, rat, magpie and carrion/hooded crow. As chick survival dropped with agricultural changes, autumn grey partridge stocks also dropped, so shoot management increasingly turned away from wild birds in favour of released pheasants and red-legged partridges in order to sustain bags. Reducing the number of partridge predators, which was part of the traditional role of the gamekeeper, stopped or became less intensive. See chapter 5 for more information on predation control. This led to an increase in predation pressure[59], particularly on incubating females and their eggs, which was exacerbated by the lower availability of nesting habitat[45,46].

Hence there were three causes of the decline of the grey partridge in the UK, and these were described as the "three-legged stool": a fall in chick-food invertebrates, a reduction in nesting cover, and a rise in predation pressure. For partridge conservation, all three of these issues must be addressed – a three legged stool will only stand with all three legs in place.

Why is it continuing?

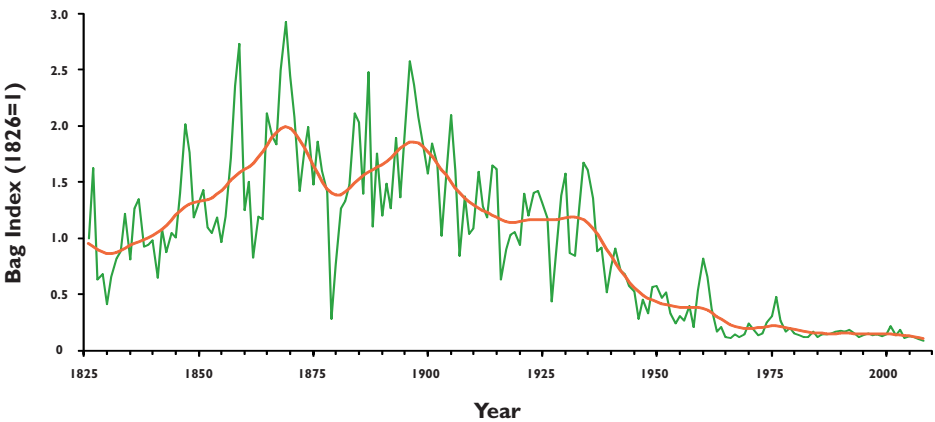
These changes to farming methods mean that the resources partridges depend on are now scarce on most modern farmland. The loss of hedgerows and field edges has led to large open fields with little nesting cover. Modern spraying regimes for arable crops leave few arable weeds and few invertebrates within a much more uniform farmed landscape,

where it is harder for partridge chicks to find food in the summer, and adults to find food or cover in the winter. The abundance of generalist predators is higher now than it was 50 years ago[48,60], see chapter 5.

Why are grey partridges on the quarry list when they are in national decline?

Shooting can be a powerful incentive to conserve and reverse local declines of a species. The areas with the most grey partridges in the UK are those where the most grey partridges are shot. This is because shooting motivates land managers to perform active conservation for them, in the form of habitat management (provision of nesting cover, insect-rich brood-rearing habitat, winter food and cover) and predation control[55]. The Code of Good Shooting Practice calls for a moratorium on shooting wild grey partridges where they are not being conserved and when the local population is below 20 birds per 100 ha in autumn.

Figure 4: Grey Partridge index from NGC bags
(1826-2008)



Long-term change in the index of grey partridges shot in the UK, as recorded in the GWCT National Gamebag Census. Numbers were high from around 1880 to World War 2, because farming methods and intense gamekeeping produced an environment in which grey partridges could thrive. Even if gamekeeping activity were comparable, a conventionally farmed modern landscape cannot support the same numbers as in the past.

Can we release grey partridge to boost the wild population?

Generally, no, because the survival of reared and released grey partridges is poor in the wild, as is the breeding success of any survivors[67,68]. Grey

partridge release could even be counter-productive for the local wild population, so shoots should take expert advice.

The first recommendation in the GWCT guidelines for re-establishing grey partridge through releasing is *"Where grey partridges are still present (over two pairs/km^2 on at least 4 km^2), releasing is inappropriate."* Under these circumstances, partridge recovery can and should be brought about by habitat improvements and predator management. For example, a GWCT demonstration project at Royston (2002-2010) increased the local grey partridge spring population density from 2.9 to over 18 pairs per km^2 in five years[44].

Follow the Code

Stop shooting

"Wild grey partridges should only be shot where they are actively conserved, and autumn stocks are above 20 birds per 100 hectares. Shooting should stop to prevent populations falling below this threshold."

What can be done to support wild grey partridges?

Many years of scientific research, experiments and demonstration sites have shown what is needed to support wild grey partridge conservation within a modern farming environment. Suitable partridge habitat should provide adequate cover for nesting, brood foraging and shelter from adverse weather and predators. All of these habitats are increasingly rare on farmland, for example with the loss of hedgerows, weeds from crops and overwinter stubbles.

Partridge-friendly management needs to address all three legs of the three-legged stool, otherwise it will collapse! Hence taking each one in turn:

What nesting habitat do they need?

Partridge breeding density is closely associated with the amount of nesting cover available[61]. The best nesting location is in thick tussocky grass cover, often at the base of a field boundary or on low banks slightly raised above the general field level. The site needs to be dry, sheltered and well concealed, with plenty of "residual" grass – dead grass from the previous year that helps with camouflage[39]. Beetle banks, hedgerows

with rank vegetation at their base or perennial grassy cover at the edge of fields are all suitable. See chapter 4 for further information.

The loss of nesting cover in the modern countryside is one of the driving forces behind partridge declines. For the grey partridge population to recover to the target set by the 1995 Biodiversity Action Plan, computer models show that there would need to be 6.9 kilometres of nesting cover per km^2, along with 5% of arable land being insect-rich brood rearing cover[47,62]. The average amount of hedgerow on typical arable farmland is 4 kilometres per km^2 so there would need to be a substantial increase, or addition of other nesting cover[46,62].

What brood-rearing habitat do they need?

Grey partridge chicks need to eat lots of insects during the first two weeks of life for strong growth and high survival. They need insect-rich habitats near their nesting areas, where the hen can lead her chicks when they hatch to forage for food and seek shelter. Brood-rearing cover can be provided by conservation headlands, game crops such as strips or blocks of wild bird mix, or other forms of open, insect-rich vegetation that give both food and shelter at the same time. The structure of the vegetation in these foraging habitats is very important – it must have an upper canopy for protection, with an open structure underneath to allow chicks easy passage[52,63].

How can predation be reduced?

Being ground-nesting, breeding partridges are very vulnerable to predation. In conjunction with the provision of nesting cover, carrying out legal predator control to reduce numbers of generalist predators during the breeding season can ease this pressure and ensure that the grey partridge can fulfil its naturally high breeding potential[64].

Is there anything else?

At the same time, the provision of overwinter cover in the form of game cover crops, wild bird seed mixes, green manure or winter fodder crops provides food and protection from the weather and predators in winter months. The risk of predation by raptors is highest in February and March, when many sources of cover are ploughed up as part of normal farm practice. Good cover needs to be sufficiently high (approx. 30 cm), stand throughout the winter rather than die down, and ideally provide a steady accessible supply of nutritious seeds all winter. Supplementary

food in hoppers also helps birds bridge the "hungry gap" at the end of the winter, in February/March[65,66].

How do shoots know if their partridges are responding?

The key to understanding how well partridges are responding is to monitor their numbers and breeding success. Typically, this is done by counting them in spring and again in autumn. We encourage anyone interested in partridge management to join our Partridge Count Scheme (PCS). This has been running for 85 years, and coordinates partridge counts across the UK. Members of the PCS receive advice on how to count and manage grey partridges. Based on their annual count data, PCS members receive feedback on management, and information on regional and national trends against which to compare their own results[55,69]. They also contribute towards a better understanding of the current status of grey partridges on farms across the country. For more information about the PCS, see chapter 8.

How is the grey partridge doing nationally?

Nationally, the species continues to decline because too few land managers have put in place partridge-friendly management. However, the numbers recorded by PCS members show how effective partridge management measures can be. Between 2000 and 2010, the UK grey partridge population declined by 40% - down by nearly a half. Over the same period, partridge numbers on PCS sites increased by 81%[55].

Up to 75% of grey partridges nest in grass at hedgerow bottoms, and these habitats benefit a wide range of other wildlife. © GWCT

Why is there such a difference?

Members of the PCS have a particular interest in partridge conservation. They receive advice and guidance about how to support their partridges, and incorporate these techniques into their farming methods. On PCS farms, there are more management and habitat features such as grassy margins, beetle banks, brood-rearing cover, wild bird cover, winter cover, predator control and supplementary feeding[70]. The resulting difference in partridge numbers between PCS and non-PCS sites shows that these measures can be effective[55].

In a study, soon to be published, we classified PCS sites into those with a shooting interest (partridges shot in at least half the years – 753 sites) and those without (no birds reported shot – 547 sites). We calculated an index of grey partridge pairs to represent their numbers between 2000 and 2015, which rose by 91% on shoots, but dropped by 18% on sites with no shooting. In comparison, the BTO index of grey partridge numbers declined by 54% over the same time period. This means that the number of partridge nearly doubled on PCS sites that shoot, dropped slightly on PCS sites that don't shoot, and dropped by half across the country.

Are current PCS sites enough to reverse the UK population decline?

Sadly not. Although partridge conservation efforts have led to local gains on PCS sites, they are too few to influence the national downward trend. To slow or reverse the national decline, we need much more widespread application of conservation measures to support grey partridges[62]. These would also benefit many other declining farmland wildlife species[39,49].

© Peter Thompson

Did you know?

Between 2000 and 2010, UK grey partridge population declined by 40%. Over the same period Partridge Count Sites achieved an 81% increase in partridge numbers and farmland bird species on PCS sites was 24% higher.

On the GWCT demonstration site at Rotherfield, farmland songbirds of conservation concern increased by 66% over six years.

Does the grey partridge management package benefit other species too?

Yes. Management that is designed or performed with one particular species in mind often has wide-ranging benefits for others sharing the same environment. The grey partridge is considered to be an indicator species for the farmland ecosystem. Where partridges do well, biodiversity tends to be higher than where partridges are struggling.

Conservation measures designed for partridges also provide support for other farmland wildlife. For example, improved nesting habitat for partridges along hedgerows or beetle banks also provides nest sites for harvest mice[71]. Wild bird seed mixes and food hoppers designed to provide winter food for partridges also help other seed-eating farmland birds during the winter and through the "hungry gap"[4,72]. One study found that the number of farmland bird species on PCS sites was 24% higher, with a greater variety of species, than on matched reference sites[49].

At the GWCT's Rotherfield grey partridge restoration project (2010-present), farmland bird surveys were conducted to examine the effect of gamebird management on avian biodiversity. These showed that farmland songbirds of conservation concern (such as yellowhammer, skylark, linnet and house sparrow) increased by 66% across the study area over six years[73]. Partridge management is also beneficial for rare arable plants. On modern arable land, many previously common flowering plants are now seldom seen, but rare species can reappear in conservation headlands and uncultivated field margins, for example: cornflower, night-flowering catchfly, narrow-fruited cornsalad and prickly poppy[52,53].

Did you know?

The fossil record indicates that grey partridges evolved on the steppes of Eurasia at least 2 million years ago and spread westward, with grey partridge remains dated to 475,000 years ago identified at Boxgrove in Sussex by John Stewart[39]. Evidence points to them being continuously present in Britain since the last ice age (summarised in Potts 2012).

The combined measures: a successful package

When implemented as a package, the management measures designed to satisfy the needs of grey partridges throughout the year can be very successful in increasing local partridge abundance. Several GWCT projects have implemented the management package to restore grey partridge numbers, including the Royston grey partridge recovery project, the Rotherfield partridge restoration project and the Peppering partridge project in West Sussex. All three studies have successfully produced at least a six-fold increase in grey partridge breeding pairs on their managed land after five to ten years of management.

These successes are not confined to GWCT "demonstration" projects, as impressive results are also achieved by farms that have implemented the three aspects of the management package. Across the Partridge Count Scheme (PCS), trends in local partridge abundance contrast with the national decline[55]. One particular example is an estate in Eastern England where the partridge management package was implemented in 2001, when partridge counts were 4.7 pairs per km^2. After ten years of management, this had risen to 54 pairs per km^2 in 2011. Spring stocks continue to increase at this site, despite the commencement of shooting at a sustainable level[74].

Another example of private partridge management is shown in the graph overleaf. Five estates in Norfolk began partridge management in 1992 (blue line), with five unmanaged estates in the same area for comparison (red line). In 1997, two of these control estates also began partridge management and saw their densities rise (green line)[62].

On the Peppering Partridge Project (pictured below) in West Sussex, grey partridge numbers increased from 13 birds across 1000 ha in 2003 to 1,852 in 2010 © GWCT

Perhaps the best known recent example is that of the Peppering partridge project on the GWCT's Sussex Study[39,75]. Here, implementation of habitat and management to benefit grey partridges has resulted in the restoration of a wild grey partridge shoot in southern England. Numbers of grey partridges in the autumn have increased from a low of 13 birds across 1000 ha in 2003 to 1852 grey partridges in 2010[75], with a sustainable shootable surplus since then.

Figure 5: Grey Partridge spring density

Average annual spring density (pairs/km²) of grey partridges on five estates in Norfolk where partridge management began in 1992 (blue line), and on five unmanaged estates from the same area (red line), 1992-2003. In 1996, two of the formerly unmanaged estates started management (green line).

Supplementary food in hoppers helps the birds in winter and during the "hungry gap" from February to the end of May © Chris Knights

Grey partridge facts

The grey partridge is a medium-sized gamebird, being 29-31 cm in length with a 45-48 cm wingspan. The grey and brown plumage camouflages the bird well and it can be difficult to spot at a distance. The typical call is a harsh and repeated metallic sound referred to as a "Skirl-call", but grey partridges also have a range of other sounds, which include alarm calls, feeding calls or calls for gathering chicks[32].

The grey partridge lives in areas of low open vegetation interspersed with taller and denser patches such as cereals, hedgerows, scrub or rushes for cover. Grey partridges in the open are usually found within close proximity of taller or denser 'escape' cover. In the UK, grey partridges are resident throughout the year. They form pairs in early spring and stay together as a family group (covey), with their young and sometimes other lone adults throughout the summer and following winter. In January or February, the coveys break up and some dispersal occurs before territories are established and new pairs formed. The grey partridge is one of only two UK breeding bird species to stay in family groups over winter[32].

Egg-laying begins at the end of April or early May in a nest made by the female and formed by a shallow depression lined with grass and leaves in thick vegetation, such as is found at the base of a hedgerow or on a tussocky beetle bank[32].

The grey partridge lays the largest clutch of breeding birds in Britain, with 10-20 eggs, and an average clutch size of 15. If the eggs of the first clutch are lost, the female may lay a second, which will be smaller. Eggs are laid at 1-2 day intervals, and covered with nest material while laying continues. Incubation starts soon after the last egg is laid and lasts 23-25 days. Eggs are incubated by the female, while her mate remains on guard nearby. Once the young hatch they are cared for by both parents, and brooded when small. The chicks are mobile as soon as they hatch and leave the nest within a few hours, feeding themselves as they follow their parents. They become capable of fluttering off the ground at approximately 10 days, and of strong flight after 15 days[32].

Adult grey partridges feed predominantly on plant materials – green leaves of grasses, cereals and clover, and grain and weed seeds – with occasional insects. Most feeding occurs around dawn and dusk. Chick diet in the first two weeks is markedly different, containing a high proportion of insects in the diet. It is this early reliance on insects that is key to understanding the importance of chick-food resources in grey partridge conservation[46,76].

Adult flight is swift and strong, but rarely sustained for more than 1.5-2 kilometres, and this is usually only when trying to escape from a predator (or shoot drive). Grey partridges usually walk or run on the ground, interspersed with short linking flights a few metres above the ground. They roost communally – either in pairs, coveys or groups, tending to move to different sites each night – often in the middle of fields[77].

Ask the shoot

1. Do you have wild grey partridges on your shoot, if yes how many per 100 ha according to autumn counts?
2. If not, have you considered reintroduction?
3. If you do have wild grey partridges, what are you doing to support them what management plan do you have?
4. Are you releasing grey partridges?
5. Are you shooting your wild grey partridges? If so, do you comply with GWCT guidelines on sufficient numbers?
6. Which drives might there be wild greys on?
7. Are you a member of the Partridge Count Scheme?