From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

State of Bird Populations in Britain and Ireland

Robert A. Robinson
British Trust for Ornithology, The Nunnery, Thetford, Norfolk, IP24 2PU.

Abstract

The bird fauna of Britain and Ireland has been studied for over 500 years and changes in numbers over the last 40 years are well documented by a range of surveys, mostly undertaken by volunteers. Britain and Ireland are home to internationally important numbers of seabirds in the breeding season and many species of wildfowl and waders in the winter. Although there has been little overall change in total bird numbers, about half of bird species in Britain and Ireland are of conservation concern because of small or declining populations. In the last 30 years declines in farmland birds have been well documented, but declines in many woodland and migratory birds are just beginning to be recognised. Conversely, there have been increases in numbers of many raptors, seabirds and waterbirds. In general, habitat specialists have tended to decline most, while more adaptable, generalist species are increasing in number. Climate change threatens bird populations in all habitats, but loss of habitat and deterioration in habitat quality are more pressing threats. Conservationists have been successful at increasing populations of rarer species but the greater challenge will be conserving birds in the wider countryside, which will require the integration of conservation goals with wider social and landscape policies.

Introduction

More is known about the birds of Britain than the vertebrate fauna of virtually any other country. This knowledge stretches back at least five centuries, with William Turner the first to publish original observations in his *Avium praecipuarum quarum apud Plinium et Aristotlem mentio est brevis & succinta historia* [A short and succinct history of the principal birds noted by Pliny and Aristotle] in 1544 (Bircham 2007). Turner's 'succinct history' included just over 100 species that he recognized as occurring in Britain, including the phesan (pheasant[1]), bramlynge (brambling), nut-jobber (nuthatch) and solend guse (gannet). The first 'modern' ornithology was that of John Ray and Francis Willughby, which appeared in English (rather than Latin) in 1678 and which recognised around 200 species in Britain. By January 2009, 584 species had been recorded in Britain (and 460 in Ireland), representing an increase in knowledge and field effort as much as an increase in the number of species occurring (Parkin & Knox 2009).

The breeding population of birds in Britain is in the region of 75 million pairs of 220 species; a further 50 or so species visit regularly during the winter months or pass though in spring and autumn, though numbers of these are more poorly known (Appendix 1). About 200 species occur regularly in Ireland, reflecting its position further from the European mainland. Overall, populations of Britain's commoner breeding birds seem

[1] A note on names: common names follow those in widest use. Any ambiguity should be resolved by reference to scientific names, which are given in the text at first mention or in Appendix 1.

remarkably stable (Fig. 1). This simple line, though, hides much variation, with some species (e.g. seabirds) increasing in numbers, whilst others (e.g. farmland birds) have fallen dramatically. The simplicity of this figure also belies the vast amount of effort, almost all unpaid, undertaken in survey work to produce the data on which it is based. However, its strength lies in its very simplicity: the clear decline in farmland birds it demonstrates, for example, was instrumental in stimulating a policy response to address the issues underlying the decline.

In comparison to other taxa, birds are relatively to easy to monitor being popular, visible, (mostly) diurnal and (generally) countable; consequently a large amount is known about their trends, at least in recent decades and for the commoner species (Appendix 1). Rather than pick out individual species, I have tried to identify common patterns that reflect the major patterns of environmental change in our islands over the last 40 years before going on to outline some of the major challenges for bird conservation in the coming decades. But first I would like to give a flavour of the range of monitoring efforts that exist which mean we know so much about the state of our avian fauna.

Monitoring bird populations: approaches and scope

Birds vary greatly in number: from a single long-billed murrelet *Brachyramphus perdix* recorded off the Devon coast in 2006 to the wren, which may, in some years, number tens of millions of individuals. They also vary greatly in their ecology, from nightingales inhabiting dense scrub of southern Britain to the ptarmigan of the windswept Scottish uplands, and in how easy they are count, from the gannet which nests mostly on offshore stacks in Ireland and Scotland and whose population can be almost completely enumerated using aerial photography, to the cryptic and largely nocturnal woodcock for which population estimates are little more than educated guesses. Surveys of abundance therefore differ greatly in their aims and methods.

For some species, typically those with localised distributions, a complete, or almost complete, census can be contemplated; for commoner and widespread species, sample surveys must be undertaken. Large-scale sample surveys provide detailed information on an annual basis, while for trends in species monitored by census are known in less detail as these are usually less than annual owing to the greater effort required. The annual *State of the UK's birds* provides summary results from most monitoring schemes each year (e.g. Eaton et al. 2008). For rarer species collation of reported sightings may be all that is possible (Table 1). : annual summaries are produced by the Rare Breeding Birds Panel (most recently, Holling & RBBP 2008), the *British Birds* Rarities Committee (Hudson & BBRC 2008) and their Irish equivalents (Hillis 2008; Milne & McAdams 2008), as is a summary of the numbers of scarce migrants reported each year (Rogers 2006; Rattigan 2007).

Most monitoring of birds is undertaken by unpaid volunteers working in conjunction with professional scientists who direct the sampling and analyse the data collected to inform conservation and land management policies (Fig. 2). This arrangement not only allows schemes to operate over the long-term and extensive spatial scales at very low cost, it

also encourages a greater appreciation of science and the environment by participants, facilitating democratic participation in research that often has a direct impact on wider policy (Greenwood 2007).

Britain and Ireland have a long tradition of recording birds stretching back into the 19th Century; though this information is rarely quantitative, broad patterns of distribution can be mapped (Holloway 1996). Concerns over the use of pesticides in the 1950s, similar to those that led Rachel Carson to pen *Silent Spring*, prompted the Nature Conservancy (as it was then) to fund the British Trust for Ornithology (BTO) to organise an annual survey (the Common Birds Census, CBC) to measure both background variation in bird numbers and the extent of any changes as a result of pesticide poisoning, pollution or habitat change (Marchant et al. 1990). More recently this has been replaced by the Breeding Bird Survey (BBS), which provides more representative coverage of a greater range of species nationally, but less detailed information at each site (Newson et al. 2008).

For species that are too scarce to occur on a sufficient number of CBC or BBS sites, targeted surveys must be organised, often using specifically tailored methods. Species covered in this manner range from seabirds through Dartford warbler to golden eagle, with an honourable mention to the Heronries Census which began in 1928 and is the longest running annual single species survey in the world. Summary results from these surveys are presented in the annual *State of the UK's Birds* report (published jointly by Britain's bird conservation organisations) and at www.bto.org/birdtrends. These specific surveys are supplemented, every 20 years or so, by national atlases which aim to record the distribution (and relative abundance) of all regularly occurring species (Marchant et al. 2004). Most counties in Britain have also produced at least one local atlas (Ballance 2000) and the next atlas covering Britain & Ireland will be published in 2013 (www.birdatlas.net).

Monitoring of numbers (or relative abundance) is really just the first step. There is little point in monitoring unless appropriate action follows changes (up or down); determining the threshold at which action is required is a key conservation priority. Long-term quantitative data on trends mean that the status of species can be objectively assessed, resulting in much greater transparency in the conservation designation process (Eaton et al. 2009). Amongst waterbirds, high quality counts have also allowed site designation criteria (e.g. of Specially Protected Areas) to be based on the number of birds using the site as a proportion of the flyway population. They also enable alerts to be issued when populations decrease at site, regional or national level, helping to direct conservation and management policies (Atkinson et al. 2006). Understanding the cause of population change is aided by knowledge of the demography of the population, i.e. reproductive output, survival and dispersal between populations (Fig. 2). Combining information on population size, demography and environmental processes can yield powerful insights into the mechanisms of population change (e.g. Frederiksen et al. 2004; Robinson et al. 2004; Freeman et al. 2007b). This can be critical in identifying the key environmental drivers of change and effective management actions (Baillie 1990). Such actions may be required both if species are declining, of if they increase to the extent where they cause economic impacts on other users of the countryside.

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

The changing state of Britain and Ireland's birds

Because they are islands, Britain and, especially, Ireland have smaller bird faunas than might be expected, with several species that are common on the near continent missing (Fuller et al. 2007). Some species are also at the edge of their range, either northern, such as reed warbler and nuthatch, or southern, such as dotterel and snow bunting. Their oceanic position and extensive coastline mean our islands support large populations of breeding seabirds; more than 20% of the European population of nine species, and more than half of the world population of three: gannet, bonxie (great skua) and Manx shearwater breed in Britain or Ireland (Burfield & van Bommel 2004). In winter, Britain and Ireland also support internationally important populations of many geese and waders (Delany & Scott 2006; Appendix 1). Only two species of global conservation concern occur regularly: Balearic shearwater (Critically Endangered) and aquatic warbler (Vulnerable), both on passage. A further six are classified as Near Threatened: sooty shearwater, red kite, corncrake, curlew, black-tailed godwit and Dartford warbler. Only one species, Scottish crossbill, is endemic but around 35 species have endemic races, four of which are restricted to Ireland.

One species occurring regularly in Britain and Ireland has become globally extinct: the last great auk *Pinguinis impennis* in Britain, was killed on Stac an Armin, St Kilda in the 1840's on the tragic presumption that it was a witch. Several species, though, have essentially disappeared as breeding birds in these islands but remain common elsewhere including: great bustard *Otis tarda* (extinct by mid 19th Century), black tern and Kentish plover *Charadrius alexandrinus* (mid 20th Century), wryneck, red-backed shrike and, in Ireland, corn bunting (late 20th Century). In the last 50 years though, these have been offset by re-colonising former breeders, such as avocet new breeding species, notably little egret, collared dove and, in England, Cetti's warbler, and introduced, non-native, species such as Egyptian goose (Fig. 3) and rose-ringed parakeet.

Comprehensive accounts of changes in individual species' status are available in Brown & Grice (2005, England), Forrester & Andrews (2007, Scotland), Hutchinson (1989, Ireland) and Lovegrove et al. (1994, Wales) and summarised in Parkin & Knox (2010). Because man has had such a huge influence on the British and Irish landscape, bird populations in particular habitats often exhibit similar trends in response to common environmental drivers (Fuller & Ausden 2008). I have structured the text around habitats to identify common themes among species inhabiting them. Most of the patterns described are common to both Britain and Ireland, as many of the drivers and trends are similar in these two countries; however data are much more readily available for Britain, which has had a stronger, and longer, history of monitoring bird populations, so these are more often quoted.

Marine

Seabirds are mostly ground and burrow nesters and consequently tend to nest on remote cliffs and islands where nest predators are few. Nowhere has this been more evident than

in the west of Scotland, where breeding seabirds, such as tystie (black guillemot) and Arctic tern, have all but disappeared from many locations as a result of depredation by American mink *Mustela vison* (Craik 1997). More widely, ship rat *Rattus norvegicus* predation has been associated with local declines of Manx shearwater and puffin colonies. Eradication of both predators is underway at some colonies, but is an arduous task (e.g. Moore et al. 2003).

Food availability is a strong driver of seabird population dynamics. An increase in the availability of food, particularly discards from the fishing industry, over the last century has been associated with dramatic increases in the numbers of fulmar and bonxie (great skua) (Mitchell et al. 2004); cormorants, meanwhile, have prospered on well-stocked inland waters used by anglers (Carss & Ekins 2002). The importance of food supply for seabird populations has been demonstrated by complete breeding failures in some areas in recent years when food has been scarce of species, such as kittiwake and puffin, which rely on sandeels *Ammodytes* to feed their chicks. When sandeel stocks collapsed around Shetland between 1985 and 1990, very few chicks were reared successfully leading to population declines in several species. Although over-fishing played a part in this decline, most fishing activity occurs beyond the foraging range of colonies and often targets bigger sandeels than seabirds forage on. Increases in sea temperatures forcing the sandeel spawning stock northwards, away from the colonies, seem to have been more important (Frederiksen et al. 2004).

Seabirds spend most of their lives at sea, only coming ashore to breed for two to three months each year. Despite the importance of offshore areas, relatively little is known about the status of seabirds at sea, although newly developed technologies, such as geo-locators and data-loggers are providing exciting insights into the use of marine habitats far from shore. During the breeding season parents probably forage in hotspots near thermal fronts or areas of upwelling which tend to be rich in food, but in winter birds are much more dispersed (Stone et al. 1995). In recent years oil spills have killed many thousands of birds, particularly guillemots and other auks, but this seems to have had rather little impact on breeding populations due to the presence of a surplus of immature and non-breeding birds (Votier et al. 2008).

Coasts and estuaries

Populations of many wintering ducks and geese was limited by hunting in the first half of the 20th century (Tubbs 1996). However, increased protection, particularly following the 1954 Protection of Birds Act, and a decline in the popularity of wildfowling have meant that numbers of most species have increased. Some have grown dramatically, numbers of pink-footed goose, rose from 30,000 in the early 1950s to around 250,000 today, for example. Similarly, most wintering estuarine wader populations are stable or increasing, for example, grey plover and black-tailed godwit (the Icelandic race *L. limosa islandica*); this reflects both a decrease in hunting pressure and, for at least some species, habitat changes on the breeding grounds (e.g. Gunnarsson et al. 2005). Numbers of birds on non-estuarine coastal sites (where there was less of a hunting tradition), however, have shown rather more mixed trends (Rehfisch et al. 2003) with some species typical of rocky

shores, such as purple sandpiper, turnstone and ringed plover being recorded in smaller numbers more recently.

Habitat on the coastal fringe has been under threat since large-scale drainage of coastal marshes began in the late 17th century. Currently, the major threat comes from industrial development, such as new ports, renewable energy generation (offshore wind and tidal stream) and reclamation for amenity and other uses. Although populations of many waders are continuing to increase, probably from artificially low populations created by hunting pressure, this continued loss of habitat must limit their capacity for increase. In the future, coastal habitat will also be increasingly squeezed between rising sea-levels, as a result of climate change, and sea-defences, particularly in south-east England.

(Atkinson et al. 2004). Climate change is already affecting shorebird populations. The Atlantic coasts of Britain and Ireland provide a mild climate, but good foraging habitat (invertebrate rich mudflats) is scarce. Conversely, our eastern shores have large estuaries but winters can be much more severe with prolonged spells of cold weather resulting in large-scale mortality. In recent years, there has been a tendency for winters in Europe to become warmer and, consequently, we are seeing a shift in winter distribution eastward as juveniles, particularly of Fennoscandian and Siberian breeding populations, settle eastward (Maclean et al. 2008). This reflects an increased carrying capacity of eastern estuaries allowing increased juvenile settlement on estuaries closer to their breeding grounds. Adult birds show high site-fidelity so are probably showing little change in distribution and introducing a lag in the population response of climate change. In itself, such redistribution does not pose a threat to populations providing sufficient habitat is present, but it does mean that site designations (usually based on numbers using a site) may need to be reassessed and that conservation strategies will increasingly need an international dimension, considering the flyway in its entirety.

Farmland

One of the most obvious changes in land-use over the last fifty years has been the intensification of agriculture and the loss of mixed farming (Chamberlain et al. 2000; Robinson & Sutherland 2002). Populations of farmland bird species mirror changes in agriculture throughout the 20th Century (Shrubb 2003). The area of agricultural land declined markedly between the 1870s and 1930s, but the post-war desire for food self-sufficiency saw a boom in cultivation and populations of many farmland species increased greatly in numbers, probably becoming more common in the 1970s than before or since. From around the point of Britain's entry into the European Community, advances in technology and generous production subsidies, such as guaranteed prices, meant that practices rapidly began to change: new crop varieties were introduced, crop rotations changed, chemical inputs increased, and farms became ever larger, specialising in either arable crops or livestock because of the need for expensive machinery (Fig. 4). Changes in pastoral farming have been equally marked with increased fertiliser usage, a switch from hay to silage cropping and increased stocking densities (Vickery et al. 2001). The primary effect of these changes has been a decrease in habitat heterogeneity at all scales, from within fields to across landscapes (Benton et al. 2003).

These changes have had a catastrophic effect on farmland bird populations (Fig. 1), with a litany of declines in the last 40 years amongst the species most closely associated with farmed land: tree sparrow 97%, corn bunting 86%, grey partridge 87% and skylark 59%[2]. Declines in many once common species such as quail, corncrake and cirl bunting preceded these, but went unquantified (Fuller 2000; Newton 2004). Of course, some species increased, notably woodpigeon *Columba palumbus* (143%) and corvids, such as Jackdaw *Corvus monedula* (87%), probably as a result of reduced persecution and, in the case of woodpigeon, extensive sowing of oilseed rape. Although the general intensification of agriculture has undoubtedly been responsible for most of these changes, disentangling the impacts of and relative importance of the different facets of agricultural change is difficult. Doing so is, however, important for designing effective conservation solutions and in the last 20 years has been a major research area that has fed directly into, and been informed by, policy (e.g. Vickery et al. 2004). The long history of research on grey partridge provides an exemplary study in unravelling the causes of these declines (see Chapter 18).

Targeted conservation measures have proved easier to implement for species with restricted range than for more widespread species. So, for example, management agreements with farmers in south-west England have increased the cirl bunting population four-fold since 1989 in south-west England and slowed the decline of corncrakes (Jeffs & Evans 2004) and similar action has stabilised numbers of corncrake in Ireland (Copland 2002). Although agri-environment schemes can influence breeding populations (Gillings et al. 2005), their success has been mixed (Kleijn & Sutherland 2003; Ausden & Fuller 2009) and whether the recent stabilisation of farmland bird populations (Fig. 1) is due to changes in policy, a recent run of mild winters, or because populations are simply reaching a new carrying capacity remains to be seen. The future of farmland bird populations will continue to depend on the economics of agriculture. Increases in cereal prices, for example, resulted in the abolition of set-aside for 2008, greatly reducing the availability of winter foraging habitat for many species. Ongoing monitoring, though, means the effects of such changes can be quantified and, because of this, biodiversity targets are increasingly being incorporated alongside production in framing agricultural policies.

Wetlands

A major component of agricultural intensification has been land drainage. Much lowland wet grassland has been lost, as well as unique habitats such as reed and sedge fens in the south and east of Britain and the seasonally flooded callows and turloughs of Ireland (Wakeham-Dawson & Smith 2000). Consequently, some fen specialists, such as black tern and bittern have all but disappeared as breeding birds and species associated with lowland wet grassland, notably breeding waders, such as lapwing, snipe and redshank, have declined significantly (Wilson *et al.* 2005). In addition to direct habitat loss, wetlands are vulnerable to increased nutrient loads (eutrophication), mostly from non-

[2] Of course, some species have also increased, notably woodpigeon (143%) and corvids, such as Jackdaw (87%, all figures from Baillie et al. 2007), probably as a result of reduced persecution and, in the case of woodpigeon, extensive sowing of oilseed rape.

point sources such as leaching from agricultural land, and scrub encroachment, particularly as a result of lowered water tables, often reducing habitat quality for those that remain.

The expansion of cities and towns in the south of England and elsewhere required the extraction of large amounts of sand and gravel for construction, holes that were often turned into reservoirs to supply water, such as those at Abberton, Chew and Rutland. Many of these newly created water bodies have since been managed at least partly with nature conservation in mind, both for species conservation and general amenity value. This has provided large amounts of new habitat for breeding and wintering waterbirds, such as great-crested grebe, tufted duck and gadwall, and inland breeding waders, notably little ringed plover.

In the last twenty years much effort has been expended in re-creating wetlands in areas which have suffered large historic losses, such as the Thames estuary and the fens of East Anglia (Hume 2008, see also www.wetlandvision.org.uk). Such projects are often targeted at 'flagship' species, particularly bittern, but many other species (and not just birds) are also benefiting. Such habitat creation is likely to become commoner in the future as developers are increasingly required to compensate for lost habitat. Habitat creation schemes seem to be more successful for wetland (and coastal) habitats than terrestrial ones (Morris et al. 2006), though whether entire communities can be simply be translocated and re-created elsewhere is a question that remains unanswered, both ecologically and morally.

Uplands

Despite their apparent bleakness, upland habitats, which range from unenclosed grazed pasture through bog and plantation forestry to arctic-alpine tundra on the high tops, support a diverse bird fauna including many of our most emblematic birds, such as golden eagle, raven and red grouse (Ratcliffe 1990). Open moor is itself the result of a long-history of land-use extending back nearly 4,000 years in some regions; much of what might once have been montane scrub and wood is now sheepwalk or acid grassland. Britain, particularly Scotland, and Ireland are internationally important for blanket and raised bogs, despite the fact that less than 20% of their original area remains. Bogs have been encroached by drainage for agriculture, afforestation and, especially in Ireland, large-scale extraction of peat for fuel and horticulture. Consequently, numbers of birds of open moor and bog, such as curlew (Fig. 5), dunlin and red grouse, have declined through habitat loss (Sim et al. 2005, Pearce-Higgins et al. 2008).

Although the uplands have long been grazed, they cannot withstand the current level of grazing pressure. High densities of red deer *Cervus elaphus* and sheep have greatly reduced vegetation diversity, diminishing both nesting and foraging habitat for birds (Fuller & Gough 1999; Clutton-Brock 2004). The number of sheep in upland areas is beginning to decrease with a shift away from headage payments, leading to scrub encroachment in some areas, which will benefit some species, such as willow warbler; deer numbers, on the other hand, are likely to continue to increase. Agriculture is also

encroaching on the uplands with marginal land being enclosed and improved (fertilised) for grazing, higher levels of drainage and an increase in silage cropping. These changes appear to have precipitated declines in a number of species associated with upland grassland, such as whinchat, wheatear and ring ousel (Henderson et al. 2004). As in lowland areas, the fate of upland bird populations will depend on the degree of habitat diversity that can be maintained at different scales (Pearce-Higgins & Grant 2006).

Although populations of moorland birds have suffered from loss of habitat due to afforestation, upland forests can provide important habitat for some species, particularly in the first 10-15 years before the canopy closes (Avery & Leslie 1990). The spread of young forest aided the recolonisation of mainland Scotland by hen harriers from the Northern Isles in the 1940s, for example. Middle-aged plantations, with a dense, dark canopy support relatively few species, but as the plantation matures, other species, such as crossbill, can colonise, so one bird community is successively replaced by another. Consequently, as plantations have matured and the area of new planting fallen, we have seen declines in tree pipit and lesser redpoll but increases in goshawk and siskin populations. Much of the conservation value of moorland communities, however, lies in their distinctness and rarity in a European context, while most species typical of conifer plantations are common throughout Europe, so increased diversity may not be a sufficient goal in itself. A key issue for the Scottish uplands is the extent to which we wish to encourage natural regeneration of broadleaf and Scots pine *Pinus sylvestris* woodland (replacing the presumed 'wood of Caledon'), which again will benefit some bird species, but be detrimental to others.

Birds of the high tops, such as ptarmigan, dotterel and snow bunting, are at the southern edge of their range in Britain and prospects for their continued existence in Britain look bleak, as the high tops are amongst the areas most likely to be affected by increasing global temperatures. In the past few decades, for example, the area of lying snow has decreased markedly and, although there is little hard evidence, it seems likely that the area suitable for breeding for most of these species will decline over the next two or three decades. Whether management actions can be identified to preserve these populations, which are also suffering from increased visitor pressure, remains to be seen.

While birds of prey were once widespread across Britain, ranges of many contracted into upland areas, away from human populations, as a result of persecution and poisoning from pesticides, particularly organochlorines such as dieldrin (Newton 1979). The uplands still represent strongholds for many species, but the phasing out of organochlorine pesticides as their environmental impacts became clear and increased legal protection afforded by the 1954 Protection of Birds Act mean that most species have increased in number and expanded back into lowland areas (Greenwood et al. 2003). Persecution of raptors has often been greatest in areas of heather *Calluna* moor managed for driven grouse shooting. Relationships between raptor numbers, grouse production and habitat are complex and reductions in management intensity and overgrazing are leading to a general decline in the quality of grouse moors, both in economic and biodiversity terms (Thirgood et al. 2000). Despite increased protection,

continued persecution in some areas appears to be preventing further recovery of hen harriers and other raptors.

Woodland & Scrub

Although much of lowland Britain and Ireland would once have been woodland (not necessarily with a continuous canopy), most of our woods have for a long time been relatively fragmented and heavily modified by man (Fuller 1995). The area of semi-natural woodland (and particularly ancient woodland) is gradually reducing, but the total area of woodland has steadily increased over the last forty years, mostly through commercial planting of conifers (Mason 2007). Population trends among woodland bird species have not been consistent over the last 40 years: scarce woodland specialists, such as the lesser spotted woodpecker and willow tit, and long-distance migrants, such as spotted flycatcher and tree pipit, tend to be declining while more generalist species tend to be increasing (Fuller et al. 2005).

Undoubtedly, greatly increased deer numbers, particularly of roe deer *Capreolus capreolus* and muntjac *Muntiacus reevesi*, are having a major impact on our woodlands, resulting in a reduction in habitat quality and changes in the structure of the woodland understorey which many birds nest or forage in (Fuller 2001). In the last two to three decades there has also been a notable decrease in the intensity of woodland management; denser canopies have shaded out shrub layer plants, such as bramble *Rubus fruticosus*, to the detriment of species like nightingale, which prefer a dense shrub layer (Fuller et al. 2005). It is possible that loss of habitat diversity as a result of deer browsing and changed stand management may also increase levels of nest predation (Evans 2004). Looking to the future, short-rotation coppicing, particularly of willow *Salix*, holds potential as a source of biofuel, but its impact on bird communities will depend on where it is planted and how it is managed (Anderson & Fergusson 2006).

Scrub is a bit of a Cinderella habitat, always on the boundary. Although there are places where scrub is probably the natural habitat, storm-lashed coastal heaths and in sub-montane areas above the tree-line, it is more often a (usually unwelcome) stage in the succession of vegetation from open heath or marsh to young woodland. Yet scrub supports a distinctive community of birds, albeit one which is sensitive to the amount of cover available with, for example, tree pipit and linnet on more open heaths and garden warbler and dunnock commoner in areas with continuous canopy. They also provide an important source of food for berry-eating thrushes and others in winter. The fortunes of such species undoubtedly reflect the amount of available habitat and many will have declined due to loss of habitat to agriculture or woodland succession. More recently active habitat management has seen a great improvement in the overall condition of Britain's shrub and heath stock, so many species, like the Dartford warbler and nightjar, are currently prospering.

Afro-Palaearctic migrants are an important component of woodland and scrub communities and many species, particularly those that migrate to central and southern Africa, are declining (Hewson et al. 2007). Similar declines have been seen amongst

long-distance migrants in other habitats, and across Europe (Sanderson et al. 2006). The reasons for these declines are unclear, but could include: deterioration in habitat quality (either in Europe or Africa), increased competition from more abundant resident species as a result of milder winters, or changes in seasonal phenology. Many bird species are breeding earlier in response to warmer springs but so are their insect prey, which are emerging and maturing earlier (Crick 2004). Migrants may be constrained in the degree to which they can advance their timing of breeding because of the need to migrate back to breeding grounds, whereas insects can respond to warming temperatures more rapidly and to a greater extent. There is some evidence that in areas where insect phenology has advanced to the greatest extent, populations of pied flycatchers are doing least well because their timing of breeding is no longer so closely matched with their prey (*e.g.* Both et al. 2006). Though the extent to which these findings generalise to other regions and species is unknown, such decoupling has the potential to profoundly alter ecological systems in a way that will be difficult mitigate.

Town and gardens

Birds of town and garden are often over-looked in inventories of biodiversity, yet the area of private gardens is estimated to be approximately twice that of nature reserves (local, national and RSPB) in England & Wales (Cannon et al. 2005). Gardens support a significant proportion of the national population for some species (Gregory & Baillie 1998); the BBS, for example, identifies eight species as characteristic of urban and suburban areas: house sparrow (Fig. 6), starling, blackbird, magpie, collared dove, greenfinch, carrion crow and, increasingly, woodpigeon. They can also provide an important refuge for some species of conservation concern, such as song thrush and spotted flycatcher (Bland et al. 2004).

Birds of gardens tend to be those that are common (or, well, garden!) and populations of such species are generally increasing, at least in part because of the increased provision (and in greater variety) of food (Jones & Reynolds 2008). Food provision can also be important for species in the wider countryside, for example, goldfinches are increasingly exploiting garden feeders in winter as seed supplies in farmland decrease. Urban areas can also provide other resources, for example, the number of herring gulls nesting on flat roofs is increasing markedly, in contrast to declining populations in coastal areas (Raven & Coulson 1997). However, even within towns, though, suitable habitat can be quite patchy, for example, house sparrows, once ubiquitous, now tend to be associated only with particular types of housing (Shaw et al. 2008) for reasons which are unclear but which may be related to the availability of nest sites or foraging opportunities.

Urban expansion still represents a threat of habitat loss and fragmentation. Over the next twenty years, around 200,000 new homes are expected to be required annually in England and there is a limit to how many can be built on brownfield sites (Barker 2006). Such effects extend beyond direct habitat loss, for example the number of breeding nightjars is lower on heathland closer to towns because of greater disturbance from visitors (Liley & Clarke 2003). Whether human disturbance actually affects population

levels is unknown, but access to, and management of, the countryside will continue to increase, so quantifying such impacts will be important (Sutherland 2007).

Summary

Overall, more species have increased than decreased over the last three to four decades (Fig. 7), however, about half of Britain's and Ireland's breeding species are of conservation concern in a national context because of small, declining or concentrated populations (Gregory et al. 2002; Lynas et al. 2007). Declines amongst farmland birds have been well documented, but widespread declines in woodland and migratory species are only just being recognised. Even populations of species once considered as pests, such as house sparrow and bullfinch, have declined by as much as 50%. More generally, habitat specialists have tended to decline while commoner, more adaptable species have increased. Habitat specialists tend to be those of most conservation interest precisely because they are often restricted in range or abundance. Historically, habitat loss and fragmentation have been major drivers of population change, but deterioration in habitat quality is now at least as important (Fuller & Ausden 2008).

Rarer species (those with fewer than 1,000 individuals) have tended to fare better, while scarce species (those with fewer than 100,000 individuals) are doing worse (Fig. 8). Targeting rarer species, for example cirl bunting (agreements with farmers) and goldeneye (providing nest boxes), with conservation measures is relatively easy; increasing numbers of more widespread species that are currently declining will be much harder. Many species that suffered from persecution have benefited from increased legal protection, so most raptors, for instance, are increasing (although not in all areas). Many wildfowl populations are also increasing, though coastal habitats continue to be severely threatened both from human development and a changing climate. Similarly, although seabird populations have increased in recent decades, whether this will hold true as climates change remains to be seen.

The future for Britain and Ireland's birds

Bird conservation has a long history in Britain: St Cuthbert created a sanctuary for birds on Inner Farne (Northumberland) in 676; the first Parliamentary Act (protecting game species) was passed in 1831 and the Society for the Protection of Birds was formed in 1889 (it gained its Royal Charter in 1904). An idea of the popularity (and influence) of bird conservation can be gained from membership of the RSPB, which currently stands at just over one million, nearly twice that of the combined membership of Britain's three main political parties (c. 560,000). Reflecting this interest and the availability of data, the UK government has adopted an index of bird numbers as a surrogate for biodiversity generally in its measure of environmental sustainability, an initiative subsequently followed by the European Union (Gregory et al. 2005). Despite their flaws, such simple measures can be highly effective in communicating the need for action to policy makers and others. High-profile re-introduction projects, such as those of red kite and white-tailed eagle, have also been influential in engaging interest in conservation, as well as providing income for local economies (Carter et al. 2007. People have a greater interest

in bird conservation if they see its benefits directly, and politicians need to know it matters to their electorate, as well as what solutions are available to particular problems).

Bird conservation is increasingly moving beyond the nature reserve. It is no longer just about protecting particular species on nature reserves (though this will, of course, remain an important challenge), but rather the much more difficult task of integrating conservation goals with other landscape planning priorities (Sutherland 2004; Robinson 2006). For example, wild geese often forage on farmland creating an economic conflict between conservationists and farmers, one that has increased as goose populations have grown (Vickery & Gill 1999). More generally, is farmland solely for producing food, or should it also provide habitats for wildlife? More generally, should we have a smaller area of intensively farmed land, leaving room for undisturbed semi-natural habitat elsewhere, or more extensive areas of less-intensively managed land (e.g. Green et al. 2005)? The answers to such questions need to recognise that people value, and gain benefits from, the biodiversity immediately around them (Pretty et al. 2007). This often means birds as the most visible component of our fauna, but the balance between food production and biodiversity is one for society to determine.

The drivers of bird population change increasingly act at an international scale; trends in bird populations in Britain are similar to those in (north-western) continental Europe (Burfield & van Bommel 2004). For example, the loss of farmland birds in Britain is mirrored across western Europe reflecting common agricultural policies (Donald et al. 2001). Trends in migratory birds are also similar across Europe, perhaps reflecting changes in shared wintering quarters, similar patterns of land-use across Europe, or a changing global climate (Sanderson et al. 2006). Bird conservation thus needs to be co-ordinated internationally and there is evidence that a coherent site protection policy across countries, such as the Natura 2000 network, can deliver increased bird populations (Donald et al. 2007).

In the longer-term, changes in climate will have an over-arching impact on bird populations, either directly, for example, rising sea-levels reducing coastal habitat (Crick 2004), or indirectly, perhaps by altering patterns of agriculture or development (Olesen & Bindi 2002). The most demonstrable effect of climate change on bird populations has been changes of range: the northern edge of bird distributions is moving north, both during the summer (on average by 20km between 1970 and 1990, Thomas & Lennon 1999) and winter (e.g. wader distributions have moved northeast by 85km since the late 1970s, Maclean et al. 2008) and these changes are predicted to continue (perhaps by as much as 550km across Europe by the end of the century, Huntley et al. 2008). Such changes are clearly profound, and may result in new avian communities evolving with complex, and unpredictable, consequences. Huntley et al. (2008) predict future ranges will only overlap by 40% with current ranges, so a key priority will be ensuring the landscape is sufficiently permeable to allow ranges to shift and that suitable habitat is available to move into. This will be a challenging goal given the current intensity of land-use over much of Europe.

In Britain, the main legislation protecting birds are the Wildlife and Countryside (1981, and amendments) and the Countryside and Rights of Way (2000) Acts. Increasingly, though, there is a need for internationally co-ordinated legislation such as the European Birds Directive (79/409/EEC), which provides for Special Protection Areas (SPAs) to protect bird populations which, along with Special Areas of Conservation (SACs) designated under the Habitats Directive (92/43/EEC), form the core of the Natura 2000 reserve network across Europe. This network has increased numbers of species listed under the Directive in countries where it has been developed (Donald et al. 2007). With changing climates such co-ordinated networks of protected sites will increasingly be needed if species are to adapt their ranges appropriately.

Bird populations have changed dramatically over the last 15,000 years (Yalden & Albarella 2008) and even over the last 200 years (Gibbons et al. 1996); future changes, both positive and negative, are inevitable and will be contingent on our management of the landscape. We cannot preserve our countryside or wildlife in aspic, so what is needed is a coherent vision of the mix of habitats we would like to see; that is moving away from conserving 'original-natural' landscapes, which may be semi-mythical anyway, to creating 'future-natural' landscapes which support functioning ecosystems (Ausden & Fuller 2009). These will be expensive to create, so biodiversity goals need to be integrated with ecosystem services (such as carbon sequestration or flood management) to satisfy wider social and land management aims. In broad terms, we probably have sufficient understanding to benefit populations of scarce specialists, especially within protected areas, and recent increases in stone curlew, corncrake and cirl bunting, amongst others, show how effective evidence-based conservation measures can be (Aebischer et al. 2000). The greater challenge will be in maintaining landscapes that are sufficiently diverse that such intervention becomes unnecessary.

Acknowledgements

Most of the schemes referred to are partnerships between several organisations, notably the British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB), Wildfowl and Wetlands Trust (WWT), the Joint Nature Conservation Committee (JNCC, on behalf of the statutory conservation organisations: Natural England, Scottish Natural Heritage, Countryside Council for Wales and the Council for Nature Conservation and the Countryside) and, in the Republic of Ireland, BirdWatch Ireland (BWI) and the National Parks and Wildlife Service. The Breeding Bird Survey is a joint scheme of BTO, RSPB and JNCC, the Wetland Bird Survey of BTO, RSPB, JNCC and WWT and BirdTrack of BTO, RSPB and BWI. None of this chapter could have been written without the dedication and support of the many thousands of volunteers who undertake these surveys and we all owe them our gratitude. I would also like to thank the many colleagues who supplied information or ideas and particularly Graham Appleton, Natasha Atkins, Andy Clements, Rob Fuller, Colin Galbraith, Jennifer Gill and Jeremy Greenwood whose comments greatly improved earlier drafts.

References

Aebischer, N.J., Green, R.E., & Evans, A.D. 2000. From science to recovery: four case studies of how research has been translated into conservation action in the UK. In: Aebischer, N.J., Evans, A.D., Grice, P.V. & Vickery, J.A. (eds) *Ecology and conservation of lowland farmland birds*, pp 43-54. British Ornithologists' Union, Tring.

Ausden, M. & Fuller, R.J. 2009. Birds and habitat change in Britain: past and future conservation responses. *British Birds* 102:52-71.

Anderson, G.Q.A. & Fergusson, R.J. 2006. Energy from biomass in the UK: sources, processes and biodiversity implications *Ibis* 148:S180–S183.

Atkinson, P.W., Crooks, S., Drewitt, A., Grant, A., Rehfisch, M.M., Sharpe, J. & Tyas, C. 2004 Managed realignment in the UK – the first 5 years of colonisation by birds. *Ibis* 146:S101-S110.

Atkinson, P.W., Austin, G.E., Rehfisch, M.M., Baker, H., Cranswick, P., Kershaw, M., Robinson, J., Langston, R.H.W., Stroud, D.A., van Turnhout, C., Maclean, I.M.D. 2006. Identifying declines in waterbirds: the effects of missing data, population variability and count period on the interpretation of long-term survey data. *Biological Conservation* 130:549-559.

Austin, G.E., Collier, M.P., Calbrade, N.A., Hall, C. &Musgrove, A.J. 2008. *Waterbirds in the UK 2006/07: the Wetland Bird Survey*. British Trust for Ornithology, Thetford.

Avery, M. & Leslie, R. 1990. *Birds and forestry*. T. & A.D. Poyser, Calton.

Baillie, S.R. 1990. Integrated population monitoring of breeding birds in Britain and Ireland. *Ibis* 132:151-161.

Baillie, S.R., Balmer, D.E., Downie, I.S. & Wright, K.H.M. 2006. Migration watch: an internet survey to monitor spring migration in Britain and Ireland. *Journal of Ornithology* 147:254-259.

Baillie, S.R., Marchant, J.H., Crick, H.Q.P., Noble, D.G., Balmer, D.E., Barimore, C., Coombes, R.H., Downie, I.S., Freeman, S.N., Joys, A.C., Leech, D.I., Raven, M.J., Robinson, R.A. & Thewlis, R.M. 2007. *Breeding Birds in the Wider Countryside: their conservation status 2007.* British Trust for Ornithology, Thetford. (http://www.bto.org/birdtrends)

Baker, H., Stroud, D.A., Aebischer, N.J., Cranswick, P.A., Gregory, R.D., McSorley, C.A., Noble, D.G. & Rehfisch, M.M. 2006. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 99:25-44.

Ballance, D.K. 2000. *Birds in counties: an ornithological bibliography for the counties of England, Wales, Scotland and the Isle of Man*. Imperial College Press, London.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. 2009. Indexing winter gul numbers in Great Britain using data from the 1953 to 2004 Winter Gull Roost Surveys. *Bird Study* in press.

Barker, K. 2006. *Barker review of land-use planning: final report – recommendations*. The Stationery Office, London.

Benton, T.G., Vickery, J.A. & Wilson, J.D. 2003. Farmland biodiversity: is habitat heterogeneity the key? *Trends in Ecology and Evolution* 18:182-188.

Bircham, P. 2007. *A history of ornithology*. Collins, London.

Bland, R.L., Tully, J. & Greenwood, J.J.D. 2004. Birds breeding in British gardens: an underestimated population? *Bird Study* 51:97-106.

Boland, H., Crowe, O. & Walsh, A. 2008. Irish Wetland Bird Survey: results of waterbird monitoring in Ireland in 2006/07. *Irish Birds* 8:341-350.

Both, C., Bouwhuis, S., Lessells, C.M. & Visser, M.E. 2006. Climate change and population declines in a long-distance migratory bird. *Nature* 441:81-83.

Brown, A.F. & Grice, P.V. 2005. *Birds in England*. T. & A.D. Poyser, London.

Burfield, I. & van Bommel, F. 2004. *Birds in Europe: population estimates, trends and conservation status.* BirdLife International, Cambridge.

Cannon, A.R., Chamberlain, D.E., Toms, M.P., Hatchwell, B.J. & Gaston, K.J. 2005. Trends in the use of private gardens by wild birds in Great Britain 1995-2002. *Journal of Applied Ecology* 42:659-671.

Carss, D.N. & Ekins, G.R. 2002. Further European integration: mixed sub-species colonies of great cormorants *Phalacrocorax carbo* in Britain - colony establishment, diet, and implications for fisheries management. *Ardea* 90:23-41.

Chamberlain, D.E., Fuller, R.J., Bunce, R.G.H., Duckworth, J.C. & Shrubb, M. 2000. Changes in the abundance of farmland birds in relation to the timing of agricultural intensification in England and Wales. *Journal of Applied Ecology* 37:771-788.

Chamberlain, D.E, Vickery, J.A., Glue, D.E., Robinson, R.A., Conway, G.J., Woodburn, R.J.W. & cannon, A.R. 2005. Annual and seasonal trends in the use of garden feeders by birds in winter. *Ibis* 147:563-575.

Copland, A. 2002. Delivering corncrake *Crex crex* conservation in Ireland: past, present and future. *Irish Birds* 7:33-42.

Clutton-Brock, T.H., Coulson, T. & Milner, J.M. 2004. Red deer stocks in the Highlands. *Nature* 429:261-2

Conway, G.J., Burton, N.H.K., Austin, G.E. & Handschuh, M. 2008. *UK population estimates from the 2007 breeding little ringed plover and ringed plover surveys.* BTO, Thetford.

Coombes, R.H., Crowe, O., Lysaght, L., O'Halloran, J., O'Sullivan, O. & Wilson, H.J. 2006. *Countryside Bird Survey Report 1998-2005*. BirdWatch Ireland, Wicklow.

Craik, C. 1997. Long-term effects of North American Mink *Mustela vison* on seabirds in western Scotland. *Bird Study* 44:303-309.

Cranswick, P.A., Kirby, J.S., Salmon, D.G., Atkinson-Willes, G.L., Pollitt, M.S. & Owen, M. 1997. A history of wildfowl counts by the Wildfowl and Wetlands Trust. *Wildfowl* 47:216-230.

Cramp, S., Bourne, W.R.P. & Saunders, D. 1974. *The seabirds of Britain & Ireland.* Collins, London.

Crick, H.Q.P. 2004. The impact of climate change on birds. *Ibis* 146:S48-S56.

Crick, H.Q.P., Baillie, S.R. & Leech, D.I. 2003. The UK Nest Record Scheme: its value for science and conservation. *Bird Study* 50:254-270.

Delany, S. & Scott, D.A. 2006. *Waterbird population estimates – 4th ed*. Wetlands International, Wageningen, the Netherlands.

Donald, P.F., Green, R.E. & Heath, M.F. 2001. Agricultural intensification and the collapse of Europe's farmland bird populations. *Proceeding of the Royal Society of London, Series B* 268:25-29.

Donald., P.F., Sanderson, F.J., Burfield, I.J., Bierman, S.M., Gregory, R.D. & Waliczky, Z. 2007. International Conservation Policy Delivers Benefits for Birds in Europe. *Science* 317:810-813.

Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. & Gregory, R.D. 2009. Birds of conservation concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 102:296-341.

Eaton, M.A., Dillon, I.A., Stirling-Aird, P.K. & Whitfield, D.P. 2007. Status of golden eagle *Aquila chrysaetos* in Britain in 2003. *Bird Study* 54:212-220.

Eaton, M.A. et al. 2008. *The state of the UK's birds 2007*. Royal Society for the Protection of Birds, Sandy, Bedfordshire.

Evans, K.L. 2004. The potential for interactions between predation and habitat change to cause population declines of farmland birds. *Ibis* 146:1-13.

Forrester, R. & Andrews, I. 2007. *The birds of Scotland.* Scottish Ornithologists' Club, Edinburgh.

Frederiksen, M., Wanless, S., Harris, M.P., Rothery, P. & Wilson, L.J. 2004. The role of industrial fisheries and oceanographic change in the decline of North Sea black-legged kittiwakes. *Journal of Applied Ecology* 41:1129-1139.

Freeman, S.N., Noble, D.G., Newson, S.E. & Baillie, S.R. 2007a. Modelling population changes using data from different surveys: the Common Birds Census and the Breeding Bird Survey. *Bird Study* 54:61-72.

Freeman, S.N., Robinson, R.A., Clark, J.A., Griffin, B.M. & Adams, S.Y. 2007b. Changing demography and population decline in the Starling *Sturnus vulgaris*: a multi-site approach to integrated population modelling. *Ibis* 149:587-596.

Fuller, R.J. 1995. *Bird life of woodland and forest*. Cambridge University Press, Cambridge.

Fuller, R.J. 2000. Relationships between recent changes in lowland agriculture and farmland bird populations: an overview. In Aebischer, N.J., Evans, A.D., Grice, P.V. & Vickery, J.A. (eds) *Ecology and conservation of lowland farmland birds*, pp 5-16. British Ornithologists' Union, Tring.

Fuller, R.J. 2001. Responses of woodland birds to increasing numbers of deer: a review of evidence and mechanisms. *Forestry* 74:289-298.

Fuller, R.J. & Ausden, M. 2008. Birds and habitat change in Britain: a review of losses and gains in the twentieth century. *British Birds* 101: 644-675.

Fuller, R.J. & Gough, S.J. 1999. Changes in sheep numbers in Britain: implications for bird populations. *Biological Conservation* 91:73-89.

Fuller, R.J., Noble, D.G., Smith, K.W. & Vanhinsbergh, D. 2005. Recent declines in populations of woodland birds in Britain. *British Birds* 98:116-143.

Fuller, R.J., Gaston, K. & Quine, C.P. 2007. Living on the edge: British and Irish woodland birds in a European context. *Ibis* 149:S53-S63.

Gibbons, D.W. & Wooton, S. 1996. The Dartford warbler in Britain in 1994. *British Birds* 89:203-212.

Gibbons, D.W., Reid, J.B. & Chapman, R.A 1993. *The new atlas of breeding birds in Britain and Ireland: 1988-1991*. T. & A.D. Poyser, London.

Gibbons, D.W., Avery, M.I. & Brown, A.F. 1996. Population trends of breeding birds in the United Kingdom since 1800. *British Birds* 89:291-305.

Gillings, S., Newson, S.E., Noble, D.G. & Vickery, J.A. 2005. Winter availability of cereal stubbles attracts declining farmland birds and positively influences breeding population trends. *Proceedings of the Royal Society of London – Series B* 272:733-739.

Green, R.E., Cornell, S.J., Scharlemann, J.P.W. & Balmford, A. 2005. Farming and the fate of wild nature. *Science* 307:550-555.

Greenwood, J.J.D. 2007. Citizens, science and bird conservation. *Journal for Ornithology* 148:S77-S124.

Greenwood, J.J.D., Crick, H.Q.P. & Bainbridge, I.P. 2003. Numbers and international importance of raptors and owls in Britain and Ireland. In: Thompson, D.B.A., Redpath, S.M., Fielding, S.H., Marquiss, M. & Galbraith, C.A. (eds) *Birds of prey in a changing environment* pp 25-49. The Stationery Office, Edinburgh.

Gregory, R.D. & Baillie, S.R. 1998. Large scale habitat use of some declining British birds. *Journal of Applied Ecology* 35:789-799.

Gregory, R.D., Wilkinson, N.I., Noble, D.G., Robinson, J.A., Brown, A.F., Hughes, J., Proctor, D.A., Gibbons, D.W. & Galbraith, C.A. 2002. The population status of birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern 2002-2007. *British Birds* 95:410-450.

Gregory, R.D., van Strein, A., Vorisek, P., Gmelig Meyling, A.W., Noble, D.G., Foppen, R.P.B. & Gibbons, D.W. 2005. Developing indicators for European birds. *Philosophical Transactions of the Royal Society - Series B* 360:269-288.

Gunnarsson, T.G., Gill, J.A., Petersen, A., Appleton, G.F. & Sutherland, W.J. 2005. A double buffer effect in a migratory shorebird population. *Journal of Animal Ecology* 74:965-971.

Henderson, I.G., Fuller, R.J., Conway, G.J. & Gough, S.J. 2004. Evidence for declines in populations of grassland-associated birds in marginal upland areas of Britain. *Bird Study* 51:12-19.

Hewson, C.M., Amar, A., Lindsell, J.A., Thewlis, R.M., Butler, S., Smith, K. & Fuller, R.J. 2007. Recent changes in bird populations in British broadleaved woodland. *Ibis* 149: S14-S28.

Hillis, J.P. 2008. Rare Irish breeding birds 2007. The seventh annual report of the Irsish Rare Breeding Birds Panel (IRBBP). *Irish Birds* 8:365-394.

Holling, M. & RBBP 2008 Rare breeding birds in the United Kingdom in 2005. *British Birds* 101:276-316.

Holloway, S. 1996. *The historical atlas of breeding birds in Britain and Ireland: 1875-1900*. T. & A.D. Poyser, London.

Hudson, N. & BBRC 2008. Report on rare birds in Great Britain in 2007. *British Birds* 101:516-577

Hume, C. 2008. Wetland vision technical document: overview and reporting of project philosophy and technical approach. Wetland Vision Partnership. (www.wetlandvision.org.uk).

Huntley, B., Green, R., Collingham, Y. & Willis, S.G. 2008. *A climatic atlas of European breeding birds*. Lynx Edicions, Barcelona.

Hutchinson, C.D. 1989. *Birds in Ireland.*T & A.D. Poyser, Calton.

Jeffs, C. & Evans, A. 2004. Cirl bunting: the road to recovery. *The Biologist* 54:1-5.

Jones, D.N. & Reynolds, S.J. 2008. Feeding birds in our towns and cities: a global research opportunity. *Journal of Avian Biology* 39:265-271.

Kleijn, D. & Sutherland, W.J. 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity? *Journal of Applied Ecology* 40:947-969.

Lack, P.C. 1986. *The atlas of wintering birds in Britain and Ireland*. Poyser, Calton.

Liley, D. & Clarke, R.T. 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. *Biological Conservation* 114:219-230.

Lloyd, C.S., Tasker, M.L. & Partridge, K. 1991. *The status of seabirds in Britain and Ireland*, T & A.D. Poyser, London.

Lovegrove, R., Williams, G. & Williams, I. 1994. *Birds in Wales*. T & A.D. Poyser, Calton.

Lynas, P., Newton, S.F. & Robinson, J.A. 2007. The status of birds in Ireland: an analysis of conservation concern 2008-2013. *Irish Birds* 8:149-168.

Maclean, I.M.D., Austin, G.E., Rehfisch, M.M., Blew, J., Crowe, O., Delany, S., Devos, K., Deceunik, B., Günther, K., Laursen, K., van Roomen, M. & Wahl, J. 2008. Climate change causes rapid changes in the distribution and site abundance of birds in winter. *Global Change Biology* 14:2489-2500.

Marchant, J.H., Hudson, R., Carter, S.P. & Whittington, P. 1990. *Population trends in British breeding birds*. British Trust for Ornithology, Thetford.

Marchant, J.H., Freeman, S.N., Crick, H.Q.P. & Beaven, L.P. 2004. The BTO Heronries Census of England and Wales 1928–2000: new indices and a comparison of analytical methods. *Ibis* 146:323-334.

Mason, W.L. 2007 Changes in the management of British forests between 1945 and 2000 and possible future trends. *Ibis* 147:S41-S52.

Mavor, R., Heubeck, M., Schmitt, S. & Parsons, M. 2008. *Seabird numbers and breeding success, 2006.* Joint Nature Conservation Committee, Peterborough.

Milne, P. & McAdams, D.G. 2008. Irish rare bird report 2006. *Irish Birds* 8:395-416.

Mitchell, P.I., Newton, S.F., Ratcliffe, N. & Dunn, T.E. 2004. *Seabird populations of Britain and Ireland*. Poyser, London.

Moore, N.P., Roy, S.S. & Helyar, A. 2003. Mink (*Mustela vison*) eradication to protect ground-nesting birds in the Western Isles, Scotland, United Kingom. *New Zealand Journal of Zoology* 30:443-452.

Morris, R.K.A., Alonso, I., Jefferson, R.G. & Kirby, K.J. 2006. The creation of compensatory habitat – can it secure more sustainable development. *Journal of Nature Conservation* 14:106-116.

Musgrove, A.J., Langston, R.H.W., Baker, H. & Ward, R.M. 2003. *Estuarine waterbirds at low tide: the WeBS Low Tide Counts 1992–93 to 1998–99.* Wader Study Group, Thetford.

Newson, S.E., Evans, K.L., Noble, D.G., Greenwood, J.J.D. & Gaston, K.J. 2008. Use of distance sampling to improve estimates of national population sizes for common and widespread breeding birds in the UK. *Journal of Applied Ecology* 45:1330-1338.

Olesen, J.E. & Bindi, M. 2002. Consequences of climate change for European agricultural productivity, land-use and policy. *European Journal of Agronomy* 16:239-262.

Newton, I. 1979. *Population ecology of raptors*. T. & A.D. Poyser, Calton.

Newton, I. 2004. The recent declines of farmland bird populations in Britain: an appraisal of causal factors and conservation actions. *Ibis* 146:579-600.

Parkin, D. & Knox, A.G. 2009. *Checklist of the birds of Britain and Ireland (7th ed.)*. British Ornithologists' Union, Peterborough.

Pearce-Higgins, J.W. & Grant, M.C. 2006. Relationships between bird abundance and the composition and structure of moorland vegetation. *Bird Study* 53:112-125

Pearce-Higgins, J.W., Grant, M.C., Beale, C.M., Buchanan, G.M. & Sim, I.M.W. 2008. International importance and drivers of change of upland bird populations. In Bonn, A., Hubacek, K., Stewart, J. & Allott, T. (eds) *Drivers of change in uplands*, Routledge, London, pp209-227.

Perring, F.H. & Walters, S.M. 1962. *Atlas of British flora*. Botanical Society of the British Isles, London.

Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N. & Griffin, M. 2007. Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning. *Journal of Environmental Planning and Management* 50:211-231.

Ratcliffe, D.A. 1990. *Bird life of mountain and upland*. Cambridge University Press, Cambridge.

Rattigan, J. 2007. Scarce migrant birds in Ireland, 2004-2006. *Irish Birds* 8:263-298.

Raven, S.J. & Coulson, J.C. 1997. The distribution and abundance of *Larus* gulls nesting on buildings in Britain and Ireland. *Bird Study* 44:13-34.

Rehfisch, M.M., Holloway, S.J. & Austin, G.E. 2003. Population estimates of waders on the non-estuarine coasts of the UK and the Isle of Man during the winter of 1997–98. *Bird Study* 50:22-32.

Robinson, J.G. 2006. Conservation biology and real-world conservation. *Conservation Biology* 20:658-669.

Robinson, R.A. 2005. *BirdFacts: species profiles of birds occurring in Britain and Ireland* (v1.21, Jun 2008). http://www.bto.org/birdfacts.

Robinson, R.A. & Sutherland, W.J. 2002. Post-war changes in arable farming and biodiversity in Great Britain. *Journal of Applied Ecology* 39:157-176.

Robinson, R.A., Green, R.E., Baillie, S.R., Peach, W.J. & Thomson, D.L. 2004. Demographic mechanisms of the population decline of the song thrush *Turdus philomelos* in Britain. *Journal of Animal Ecology* 73:670-682.

Rogers, M.J. 2006. Report on scarce migrant birds in Britain in 2003. *British Birds* 99:74-117, 129-173.

Sanderson, F.J., Donald, P.F., Pain, D.J., Burfield, I.J. & van Bommel, F.P.J. 2006. Long-term population declines in Afro-Palaearctic migrant birds. *Biological Conservation* 131:93-105.

Sharrock, J.T.R. 1976. *The atlas of breeding birds in Britain and Ireland*. T. & A.D. Poyser, Calton.

Shaw, L.M., Chamberlain, D.E. & Evans, M. 2008. The house sparrow *Passer domesticus* in urban areas: reviewing a possible link between post-decline distribution and human socioeconomic status. *Journal of Ornithology* 149:293-299.

Sim, I.M.W., Gregory, R.D., Hancock, M.H. & Brown, A.F. 2005.Recent changes in the abundance of British upland breeding birds. *Bird Study* 52:261-275.

Shrubb, M. 2003. *Birds, scythes and combines: a history of birds and agricultural change*. Cambridge University Press, Cambridge.

Stone, C. J., Webb, A., Barton, C., Ratcliffe, N., Reed, T. C., Tasker, M. L., Camphuysen, C. J., & Pienkowski, M. W. 1995. *An atlas of seabird distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

Sutherland, W.J. 2004. A blueprint for the countryside. *Ibis* 146:S230-S238.

Sutherland, W.J. 2007. Future directions in disturbance research. *Ibis* 149:S120-S124.

Thirgood, S.J., Redpath, S.M., Haydon, D.T., Rothery, P., Newton, I. & Hudson, P.J. 2000. Habitat loss and raptor predation: disentangling long- and short-term causes of red grouse declines. *Proceedings of the Royal Society of London - Series B* 267:651-656

Thomas, C.D. & Lennon, J.J. 1999. Birds extend their range northwards. *Nature* 399:213.

Thomson, D.L., Green. R.E., Gregory, R.D. & Baillie, S.R. 1998. The widespread declines of songbirds in rural Britain do not correlate with the spread of their avian predators. *Proceedings of the Royal Society of London - Series B* 265:2057-2062.

Tubbs, C.R. 1996. Estuary birds – before the counting began. *British Wildlife* 7:226-235.

Vickery, J.A. & Gill, J.A. 1999. Managing grassland for wild geese: a review. *Biological Conservation* 89:93-106.

Vickery, J.A., Tallowin, J.R., Feber, R.E., Asteraki, E.J., Atkinson, P.W., Fuller, R.J. & Brown, V.K. 2001 The management of lowland neutral grasslands in Britain: effects of agricultural practices on birds and their food resources. *Journal of Applied Ecology* 38:647-664

Vickery, J.A., Bradbury, R.B., Henderson, I.G., Eaton, M.A. & Grice, P.V. 2004. The role of agri-environment schemes and farm management practices in reversing the decline of farmland birds in England. *Biological Conservation* 119:19-39.

Votier, S.C., Birkhead, T.R., Oro, D., Trinder, M., Grantham, M.J., Clark, JA., McCleery, R.H. & Hatchwell, B.J. 2008. Recruitment and survival of immature seabirds in relation to oil spills and climate variability. *Journal of Animal Ecology* 77:974-983

Wakeham-Dawson, A. & Smith, K.W. 2000. Birds and lowland grassland management practice in the UK: an overview. In Aebischer, N.J., Evans, A.D., Grice, P.V., & Vickery, J.A. (eds) *Ecology and conservation of lowland farmland birds*, pp 77-88. British Ornithologists' Union, Tring.

Wanless, S. Murray, S. & Harris, M.P. 2005. The status of northern gannet in Britain and Ireland in 2003/04. *British Birds* 98:280-294.

Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. 2002 *The migration atlas:movements of the birds of Britain and Ireland*. T. & A.D. Poyser, London.

Wilson, A.M., Vickery, J.A., Brown, A., Langston, R.H.W., Smallshire, D., Wotton, S. & Vanhinsbergh, D. 2005. Changes in the numbers of breeding waders on lowland wet grasslands in England and Wales between 1982 and 2002. *Bird Study* 52:55-69.

Yalden, D. & Albarella, U. 2008. *The history of British birds.* Oxford University Press, Oxford.

Table 1. Monitoring of Britain and Ireland's bird populations. Key schemes currently operating are listed with an indication of their geographic scope and year of commencement and survey interval. Results are published in books (first author, year of publication and publisher are given), annual reports (with lead organisation) or as journal articles (most recent cited).

Breeding Season				
All	Distribution Atlas	Brit. & Irel.	1972, c20yr	Sharrock (1976, Poyser); Gibbons et al. (1993, Poyser)
Common	Breeding Bird Survey	UK	1994, 1yr	www.bto.org/bbs
	Countryside Bird Survey (CBS)	Ireland	1998, 1 yr	Coombes *et al.* (2009), BirdWatch Ireland
	Waterway Breeding Bird Survey (WBBS)	UK	1998, 1 yr	www.bto.org/survey/wbbs.htm
Grey Heron	Heronries Census	UK	1928, 1 yr	*Ibis* 146:323-334
Seabirds	Seabird Colony Register	Brit. & Irel.	1969, c. 15yr	Cramp et al. (1974, Collins); Lloyd et al. (1991, Poyser); Mitchell et al. (2004, Poyser)
	Seabird Monitoring Programme (SMP)	UK	1986, 1 yr	www.jncc.gov.uk/page-1550
Scarce	Statutory Conservation Agency/RSPB Annual Breeding Bird Survey (SCARABBS)	UK	1961, various	
Rare	Rare Breeding Birds Panel (RBBP)	UK	1972, 1 yr	*British Birds* 103:2-52
	Irish Rare Breeding Birds Panel	Ireland	2002, 1 yr	*Irish Birds* 8:365-394
Non-native	Rare Breeding Birds Panel	UK	1996, 1yr	*British Birds* 100:638-649
Non-breeding Season				
All	Distribution Atlas	Brit. & Irel.	1983, c. 25 yr	Lack (1986, Poyser)
Seabirds	At-sea distribution	NW Europe		Stone et al. (1995, JNCC)
Waterbirds	Wetland Bird Survey (WeBS)	UK	1947, 1 yr	Annual report, BTO
	Irish Wetland Bird Survey (I-WeBS)	Ireland	1994, 1 yr	*Irish Birds* 8:341-350
	Non-estuarine Coastal Waterbird Survey (NeWS)	UK	1984, c. 10yr	*Bird Study* 50:22-32
Gulls	Winter Gull Roost Survey (WinGS)	UK	1953, 10 yr	*British Birds* 96:376-401
Scarce Migrants		Britain	1958, 1 yr	*British Birds* 99:74-117, 129-173
		Ireland	2004, 1 yr	*Irish Birds* 8:263-298
Rare	British Birds Rarities Committee (BBRC)	Britain	1958, 1 yr	*British Birds* 102:528-601
	Irish Rare Birds Committee (IRBC)	Ireland	1953, 1 yr	*Irish Birds* 8:395-416

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

Figure 1. Trends in UK bird populations 1970-2005. The thick line represents the average trend of 116 species of breeding bird species, and the thinner lines 19 species of farmland, 38 woodland and 20 seabird species. The index for wintering waterbirds (68 spp, dashed line) is not part of the All Species indicator. In each case the index (which is an unweighted average of the trends for each constituent species) is arbitrarily set to 1 in 1970 (1975 for waterbirds as earlier values are not available).

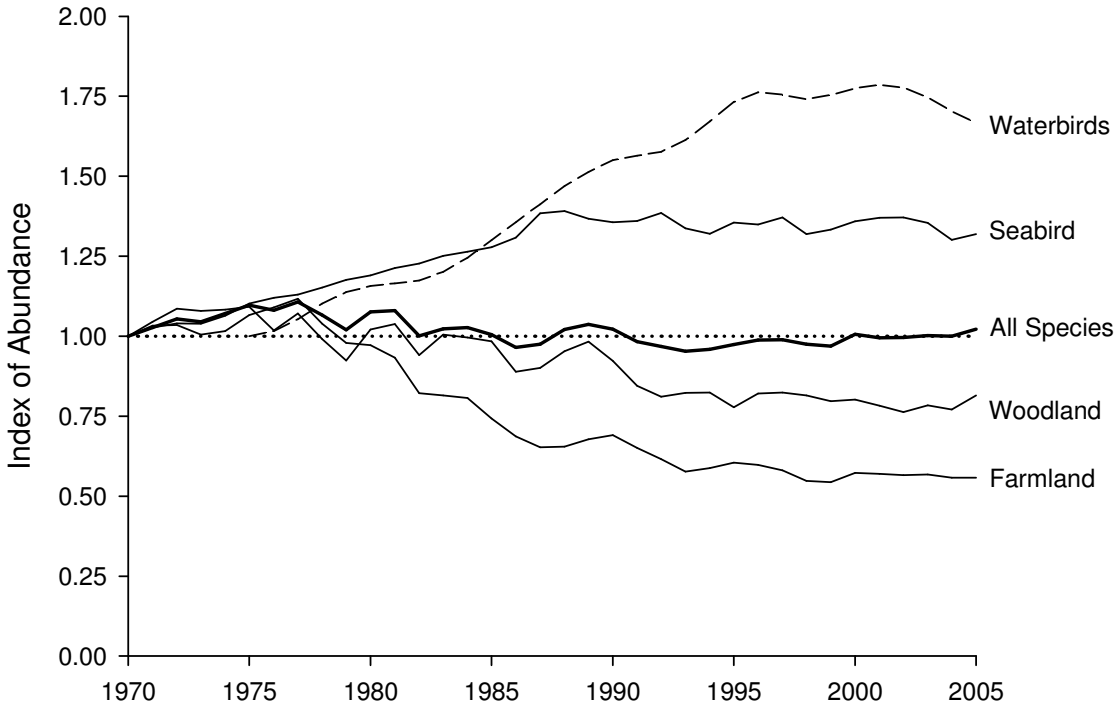
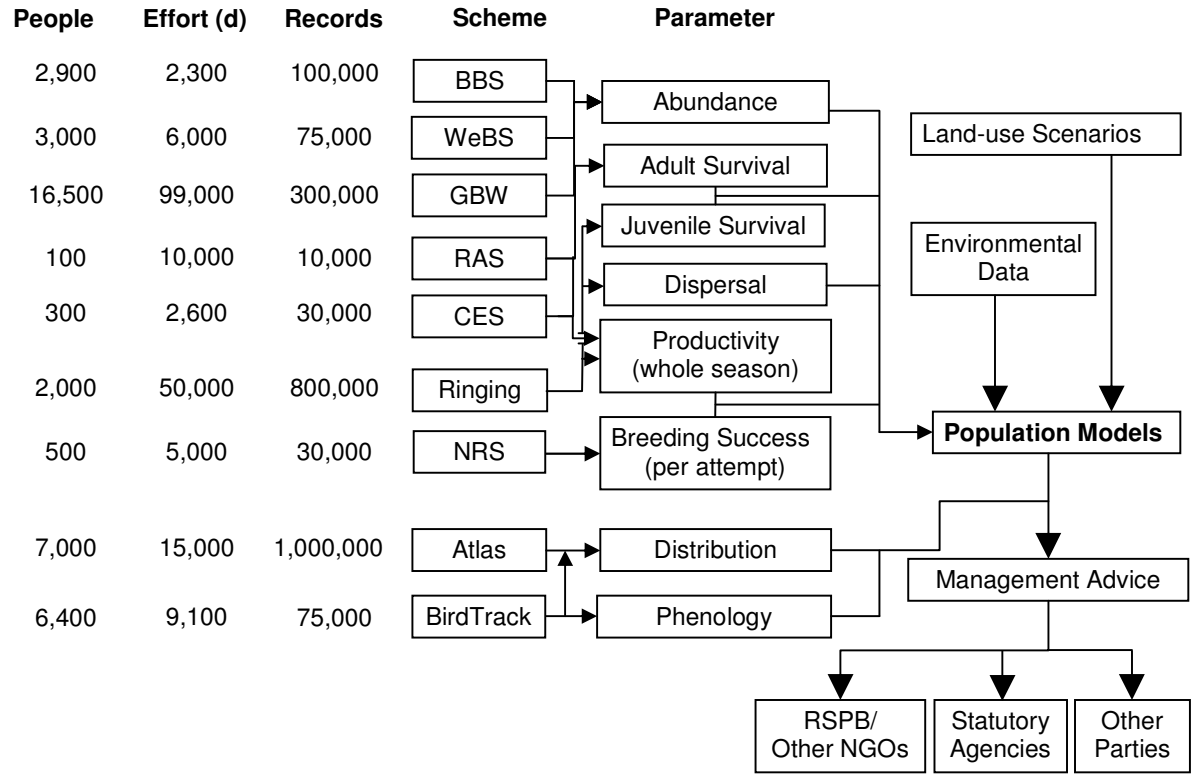


Figure 2. Integrated Population Monitoring. Each of the core monitoring schemes listed provides information on one or more key demographic parameters, which can be used to understand causes of population change through population modelling, which can then feed through into conservation or management advice to relevant stake holders. For each scheme number of participants, estimated time spent each year (days) and approximate number of records contributed annually is indicated. The schemes represented are a selection of the core annual monitoring schemes, several others also exist.



Footnote to Fig. 2. Schemes listed are: BBS –Breeding Bird Survey, GBW – BTO/CJ Garden BirdWatch, WeBS - Wetland Bird Survey, CES – Constant Effort Sites ringing scheme, RAS – Re-trapping Adults for Survival ringing scheme, NRS – Nest Record Scheme. For BBS, GBW, WeBS, Atlas (2007-2011) and BirdTrack a record is one species at one site, for NRS and the ringing schemes a record is an individual bird or nest.

Figure 4. Potential causes of population change in plant, insect and bird populations resulting from changes in arable management. The major drivers are highlighted by shading. From Robinson & Sutherland (2002)

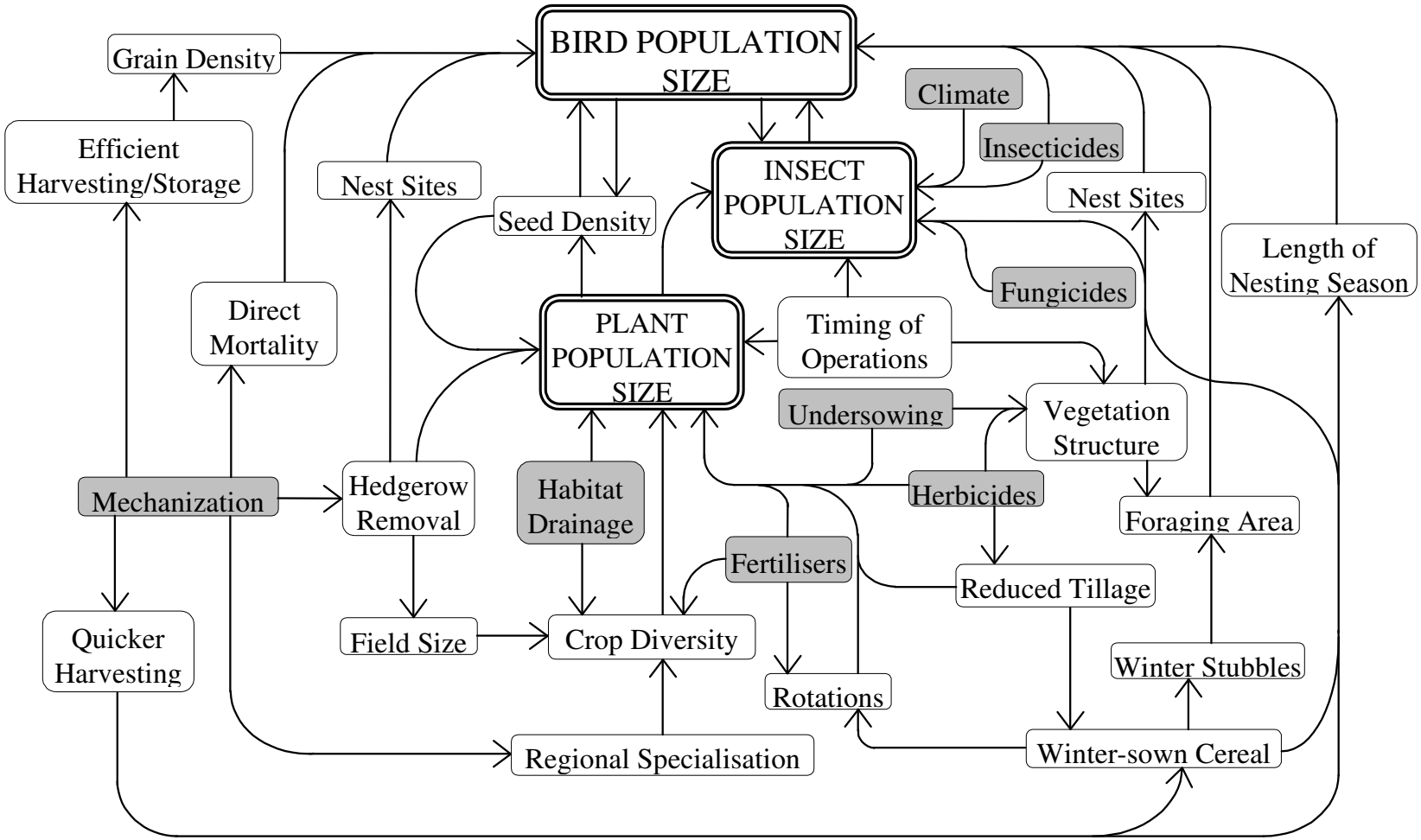


Figure 7. Population trends of British breeding birds in different habitats over the last 40 years. Species are indicated as strongly (black) or moderately (grey) increasing/decreasing or as stable/fluctuating (white). The dashed lines indicate the overall proportion of the 213 species that are increasing (38%) or decreasing (29%), also given is number of species included in each group. From data in Appendix 1.

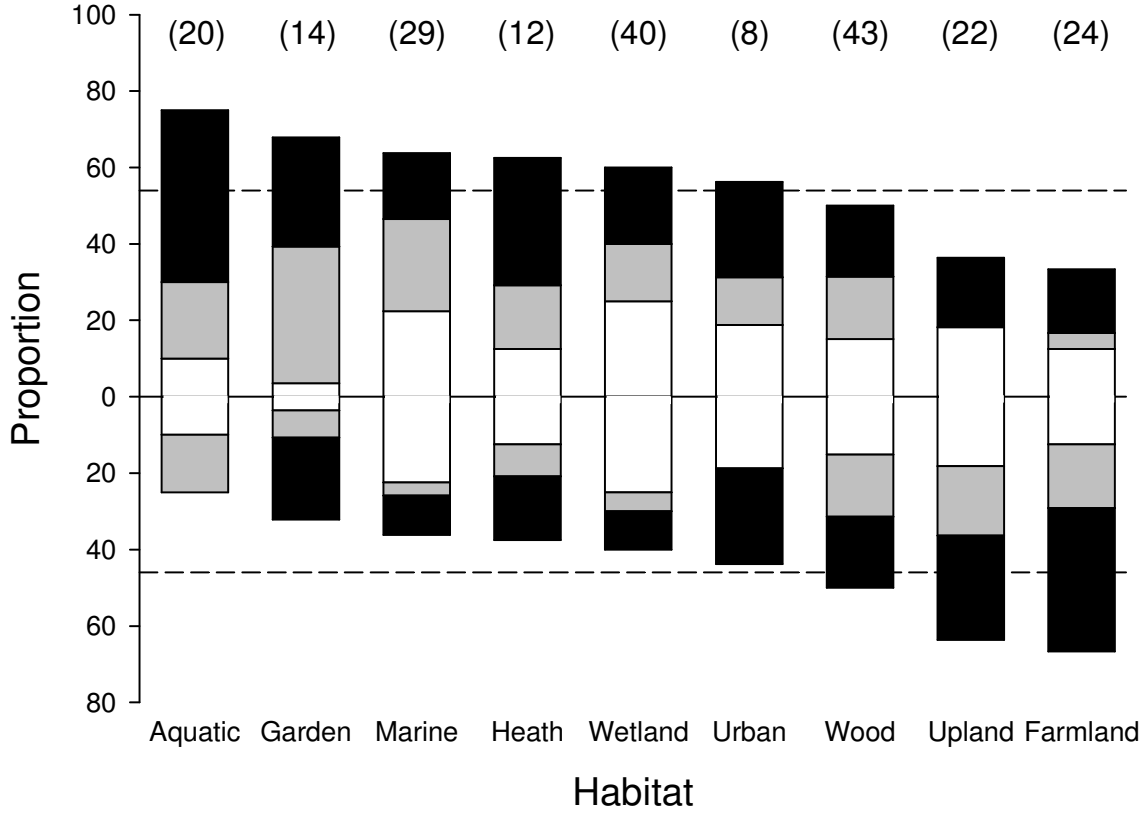
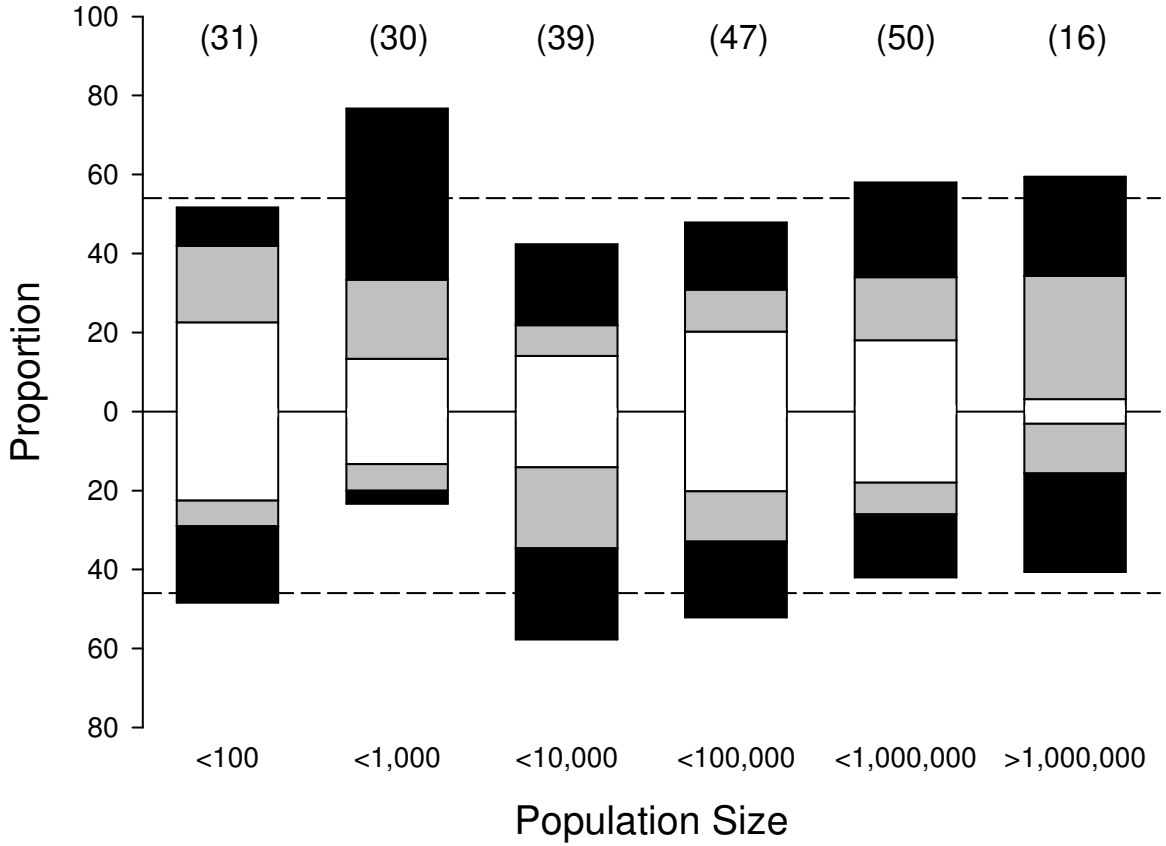


Figure 8. Population status of species breeding in Britain over the last 40 years. Species, grouped by population size, are indicated as strongly (black) or moderately (grey) increasing/decreasing or as stable or fluctuating (white). The dashed lines indicate the overall proportion of the 213 species that are increasing (38%) or decreasing (29%), also given is number of species included in each group. From data in Appendix 1.



From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

Appendix 1. Population status of species regularly occurring in Britain. Conservation status (R[ed], A[mber] or G[reen], see Gregory et al. [2002]) and year of first successful breeding (after 1900) are given. Estimates of population size in 2000 (or the nearest available year) are taken from Baker et al. (2006), updated by Robinson (2005) and Newson *et al.* (2008); populations important (> 20% of total) in a European or flyway context are highlighted in bold, based on figures in Burfield & van Bommel (2004) and Delany & Scott (2006). A qualitative assessment of population trend since the 1960s is presented: extreme decline (---, >75%) or increase (+++, >100%), steep decline or increase (--/++, >50%), moderate decline or increase (-/+, >25%), or as stable or fluctuating (~, <25% change); if the trend differs substantially before and after the 1980s these are indicated separately. Where a source is given trends are based on more or less quantitative data, but the amount and quality of information varies hugely, so they are best regarded as indicative. Question marks indicate particular uncertainties.

Species	Status [1]		First Bred	Population [2]	Trend	Source [3]
Red-throated Diver *Gavia stellata*	RB WV	A		B: 1,200 P	+/~	
				W: 17,000 I	?	
Black-throated Diver *Gavia arctica*	RB WV	A		B: 170 P	?+	
Great Northern Diver *Gavia immer*	CB WV	A	1970	**W: 2,800 I**	?	
Little Grebe *Tachybaptus ruficollis*	RB WV	G		B: 7,500 P	?-	4
Great Crested Grebe *Podiceps cristatus*	RB WV	G		B: 23,000 I	++	6
Red-necked Grebe *Podiceps grisegena*	CB WV	A	1988	W: 200 I	~	6
Slavonian Grebe *Podiceps auritus*	RB WV	A	1908	B: 40 P	~/--	10
Black-necked Grebe *Podiceps nigricollis*	RB WV	A	1904	B: 50 P	+++	12
Fulmar *Fulmarus glacialis*	RB PV	A	1878	B: 500,000 P	++/~	11
Cory's Shearwater *Calonectris diomedea*	PV	-		P: 700 I	?++	9
Great Shearwater *Puffinus gravis*	PV	G		P: >150 I	?	
Sooty Shearwater *Puffinus griseus*	PV	G		P: >1,000 I	?	
Manx Shearwater *Puffinus puffinus*	MB	A		**B: 300,000 P**	?	11
Balearic Shearwater *Puffinus mauretanicus*	PV	-		**P: >1,000 I**	?+	
Storm-petrel *Hydrobates pelagicus*	MB	A		B: 26,000 P	?	11
Leach's Storm-petrel *Oceanodroma leucorhoa*	MB PV	A		**B: 48,000 P**	?	11
Gannet *Morus bassanus*	RB PV	A		**B: 220,000 N**	++	11
Cormorant *Phalacrocorax carbo*	RB WV	A		B: 8,400 P	+	11
				W: 23,000 I	+	6
Shag *Phalacrocorax aristotelis*	RB	A		**B: 27,000 P**	~	11
Bittern *Botaurus stellaris*	RB WV	R	1911†	B: 50 M	-/~	8
Cattle Egret *Bubulcus ibis*	CB SV	-	2008	P: 10 I	+	13
Little Egret *Egretta garzetta*	RB PV	A	1995	B: 150 P	+++	8
Grey Heron *Ardea cinerea*	RB WV	G		B: 13,000 N	~/+	12
Purple Heron *Ardea purpurea*	PV	-	2010	P: 20 I	~	9
Spoonbill *Platalea leucorodia*	CB PV	A	1998	P: 160 I	+	
Mute Swan *Cygnus olor*	RB	A		B: 45,000 P	+++	4
Bewick's Swan *Cygnus columbianus*	WV	A		**W: 8,100 I**	+++/~	6
Whooper Swan *Cygnus cygnus*	CB WV	A	1910†	W: 5,700 I	~/+++	6
Bean Goose *Anser fabalis*	WV	A		W: 500 I	~	6
Pink-footed Goose *Anser brachyrhynchus*	WV	A		**W: 240,000 I**	+++	6
White-fronted Goose *Anser albifrons*	WV	A		**W: 27,000 I**	++/-	6
* Greylag Goose *Anser anser*	RB WV	A		B: 130,000 I	+++	4
				W: 120,000 I	++	6
* Canada Goose *Branta canadensis*	RB	-	1890	B: 82,000 I	+++	4
Barnacle Goose *Branta leucopsis*	WV	A		**W: 67,000 I**	+++	6
Brent Goose *Branta bernicla*	WV	A		**W: 67,000 I**	+++/~	6
* Egyptian Goose *Alopochen aegyptiaca*	RB	-	1700s	B: 1,000 I	+++	6
Shelduck *Tadorna tadorna*	RB WV	A		**B: 35,000 P**	++/~	1
				W: 78,000 I	~	6

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

* Mandarin Duck *Aix galericulata*	RB	-	1928	B: 7,000 I	+++	
Wigeon *Anas penelope*	RB WV	A		B: 400 P	?	
				W: 410,000 I	++	6
Gadwall *Anas strepera*	RB WV	A	1850	B: 770 P	++	
				W: 17,000 I	+++	6
Teal *Anas crecca*	RB WV	A		B: 2,000 P	-	
				W: 190,000 I	++	6
Mallard *Anas platyrhynchos*	RB WV	G		B: 660,000 P	+++	2
				W: 350,000 I	--	6
Pintail *Anas acuta*	RB WV	A	1869	B: 20 P	~	8
				W: 28,000 I	+++/~	6
Garganey *Anas querquedula*	MB PV	A	1862	B: 70 P	~	
Shoveler *Anas clypeata*	MB WV	A		B: 1,200 P	+/-	
				W: 15,000 I	++	6
Pochard *Aythya ferina*	RB WV	A		B: 460 P	+/~	8
				W: 60,000 I	-	6
Tufted Duck *Aythya fuligula*	RB WV	G	1849	B: 42,000 P	+	4
				W: 90,000 I	+	6
Scaup *Aythya marila*	CB WV	A	1897	W: 7,600 I	---/~	6
Eider *Somateria mollissima*	RB WV	A		B: 31,000 P	?~	
				W: 73,000 I	++/~	6
Long-tailed Duck *Clangula hyemalis*	WV	A		W: 16,000 I	?-	
Common Scoter *Melanitta nigra*	RB WV	R	1855	B: 100 P	?-	
				W: 50,000 I	?	
Velvet Scoter *Melanitta fusca*	WV	A		W: 3,000 I	?-	
Goldeneye *Bucephala clangula*	RB WV	A	1970	B: 200 P	+++/~	
				W: 25,000 I	~	6
Smew *Mergellus albellus*	WV	G		W: 400 I	~	6
Red-breasted Merganser *Mergus serrator*	RB WV	G		B: 2,200 P	?~	12
				W: 9,800 I	++/~	6
Goosander *Mergus merganser*	RB WV	G	1871	B: 2,600 P	+++	4
				W: 16,000 I	+	6
* Ruddy Duck *Oxyura jamaicensis*	RB	-	1960	B: <600 P	+++	6
Honey-buzzard *Pernis apivorus*	MB PV	A		B: 50 P	~/+++	8
* Red Kite *Milvus milvus*	RB WV	A		B: 1,000 P	+++	8
* White-tailed Eagle *Haliaeetus albicilla*	RB	R	1983†	B: 40 P	+++	8
Marsh Harrier *Circus aeruginosus*	MB PV	A		B: 360 F	+++	8
Hen Harrier *Circus cyaneus*	RB WV	R		B: 800 P	~	12
Montagu's Harrier *Circus pygargus*	MB	A		B: 10 T	+	8
Goshawk *Accipiter gentilis*	RB	G	1938†	B: 400 P	+++	8
Sparrowhawk *Accipiter nisus*	RB WV	G		B: 40,000 P	+++/~	2
Buzzard *Buteo buteo*	RB	G		B: 38,000 T	~/+++	2
Rough-legged Buzzard *Buteo lagopus*	WV	-		W: 40 I	?+	9
Golden Eagle *Aquila chrysaetos*	RB	A		B: 440 P	~	12
Osprey *Pandion haliaetus*	MB PV	A		B: 150 P	+++	8
Kestrel *Falco tinnunculus*	RB WV	A		B: 55,000 P	~	2
Merlin *Falco columbarius*	RB WV	A		B: 1,300 P	--/++	12
Hobby *Falco subbuteo*	MB	G		B: 2,200 P	+++	
Peregrine Falcon *Falco peregrinus*	RB WV	A		B: 1,400 P	+++	8
Red Grouse *Lagopus lagopus*	RB	A		B: 160,000 P	--	7
Ptarmigan *Lagopus muta*	RB	G		B: 10,000 P	?~	
Black Grouse *Tetrao tetrix*	RB	R		B: 5,100 M	--	12
* Capercaillie *Tetrao urogallus*	RB	R	1837†	B: 1,200 I	--	10
* Red-legged Partridge *Alectoris rufa*	RB	-	1770	B: 140,000 T	~	2
Grey Partridge *Perdix perdix*	RB	R		B: 72,000 P	---	2
Quail *Coturnix coturnix*	MB	R		B: 150 M	-	

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

* Pheasant *Phasianus colchicus*	RB	-		B: 1,700,000 F	++	2
* Golden Pheasant *Chrysolophus pictus*	RB	-	1870s	B: 100 P	--	
* Lady Amherst's Pheasant *Chrys. amherstiae*	RB	-	1890	B: 90 P	--	
Water Rail *Rallus aquaticus*	RB WV	A		B: 700 P	?	
Spotted Crake *Porzana porzana*	MB	A		B: 70 M	+	8
Corncrake *Crex crex*	MB	R		B: 1,100 M	---/+	8
Moorhen *Gallinula chloropus*	RB WV	G		**B: 160,000 T**	~	4
				W: 750,000 I	?	
Coot *Fulica atra*	RB WV	G		B: 110,000 P	++	4
				W: 170,000 I	~	6
Crane *Grus grus*	CB	A	1981†	B: 5 P	+	
Oystercatcher *Haematopus ostralegus*	RB WV	A		**B: 110,000 P**	+++/~	4
				W: 320,000 P	~	6
Black-winged Stilt *Himantopus himantopus*	CB	-	1945	B: <1 P		
Avocet *Recurvirostra avosetta*	RB WV	A	1941†	B: 900 P	+++	8
				W: 3,400 I	~/+++	6
Stone-curlew *Burhinus oedicnemus*	MB	R		B: 310 P	--/++	8
Lapwing *Vanellus vanellus*	RB WV	A		B: 150,000 P	++/---	2
				W: 1,800,000 I	++	6
Golden Plover *Pluvialis apricaria*	RB WV	G		B: 46,000 P	-	12
				W: 250,000 I	~/+++	6
Grey Plover *Pluvialis squatarola*	WV	A		**W: 53,000 I**	+++/-	6
Little Ringed Plover *Charadrius dubius*	MB	G	1938	B: 950 P	+	6
Ringed Plover *Charadrius hiaticula*	RB WV	A		B: 8,400 P	--	12
				W: 32,000 I	-	6
Dotterel *Charadrius morinellus*	MB	A		B: 630 M	?~	
Knot *Calidris canutus*	WV	A		**W: 280,000 I**	~	6
Sanderling *Calidris alba*	WV	G		W: 21,000 I	~	6
Little Stint *Calidris minuta*	PV	G		P: 450 I	~	
Temminck's Stint *Calidris temminckii*	CB PV	A	1934	P: 100 I	~	9
Curlew Sandpiper *Calidris ferruginea*	PV	G		P: 650 I		
Purple Sandpiper *Calidris maritima*	CB WV	A	1978	**W: 18,000 I**	~/--	6
Dunlin *Calidris alpina*	MB WV	A		B: 9,500 P	--	
				W: 560,000 I	--	6
Ruff *Philomachus pugnax*	MB PV	A	1963†	B: 40 M	~	8
				P: 700 I	-	6
Jack Snipe *Lymnocryptes minimus*	WV	G		W: 50,000 I	-/+	6
Snipe *Gallinago gallinago*	RB WV	A		B: 52,000 P	--	1
				W: 100,000 I	~	6
Woodcock *Scolopax rusticola*	RB WV	A	1820s	B: 8,800 P	---	
Black-tailed Godwit *Limosa limosa*	MB WV	R	1952†	B: 50 P	~	8
				W: 15,000 I	+++	6
Bar-tailed Godwit *Limosa lapponica*	WV	A		**W: 62,000 I**	~	6
Whimbrel *Numenius phaeopus*	MB WV	A		B: 530 P	?-	
Curlew *Numenius arquata*	RB WV	A		**B: 110,000 P**	-	2
Spotted Redshank *Tringa erythropus*	WV	A		P: 500 I	?-	6
Redshank *Tringa totanus*	RB WV	A		B: 39,000 P	--	4
				W: 120,000 I	~	6
Greenshank *Tringa nebularia*	RB WV	G		B: 1,000 P	++	
				P: 4,300 I	++	6
Green Sandpiper *Tringa ochropus*	CB WV	A	1959	B: 2 P	+	
				P: 2000 I	+	
Wood Sandpiper *Tringa glareola*	CB WV	A	1959	B: 10 P	++	8
Common Sandpiper *Actitis hypoleucos*	MB	G		B: 50,000 P	~/-	4
Turnstone *Arenaria interpres*	WV	A		**W: 50,000 I**	~	6
Red-necked Phalarope *Phalaropus lobatus*	MB	R		B: 40 M	~	8

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

Grey Phalarope *Phalaropus fulicarius*	PV	-		P: 300 I	~	9
Pomarine Skua *Stercorarius pomarinus*	PV	G		?		
Arctic Skua *Stercorarius parasiticus*	MB PV	G		B: 2,100 P	+++/-	11
Long-tailed Skua *Stercorarius longicaudus*	PV	G		?		
Great Skua *Stercorarius skua*	MB PV	A	1770s	**B: 9,600 P**	+++	11
Mediterranean Gull *Larus melanocephalus*	MB WV	A	1968	B: 110 P	~/+++	8
Little Gull *Hydrocoloeus minutus*	CB PV	G	1975	?	++	
Sabine's Gull *Larus sabini*	PV	-		P: 150 I	~	9
Black-headed Gull *Chroicocephalus ridibundus*	RB WV	A		B: 128,000 P	~	11
				W: 2,200,000 I	+++/-	14
Common Gull *Larus canus*	RB WV	A		B: 48,000 P	++	11
				W: 700,000 I	+++	14
Lesser Black-backed Gull *Larus fuscus*	MB WV	A		**B: 110,000 P**	++	11
				W: 130,000 I	+++	14
Herring Gull *Larus argentatus*	RB WV	A		B: 130,000 P	--	11
				W: 730,000 I	~	14
Yellow-legged Gull *Larus michahellis*	CB PV	-	1995	B: <1 P	+	
Iceland Gull *Larus glaucoides*	WV	G		?	?+	
Glaucous Gull *Larus hyperboreus*	WV	G		?	?-	
Great Black-backed Gull *Larus marinus*	RB WV	G		B: 17,000 P	~	11
				W: 76,000 I	?++	14
Kittiwake *Rissa tridactyla*	RB WV	A		B: 370,000 P	~	11
Sandwich Tern *Sterna sandvicensis*	MB	A		B: 11,000 P	~	11
Roseate Tern *Sterna dougallii*	MB	R		B: 100 P	---	11
Common Tern *Sterna hirundo*	MB	G		B: 10,000 P	~	11
Arctic Tern *Sterna paradisaea*	MB	A		B: 53,000 P	+/-	11
Little Tern *Sternula albifrons*	MB	A		B: 2,000 P	+/-	11
Black Tern *Chlidonias niger*	CB PV	G		?	?	
Guillemot *Uria aalge*	RB WV	A		**B: 1,300,000 I**	+++	11
Razorbill *Alca torda*	RB WV	A		B: 160,000 I	++	11
Black Guillemot *Cepphus grylle*	RB	A		B: 38,000 I	~	11
Little Auk *Alle alle*	WV	G		?	?	
Puffin *Fratercula arctica*	RB WV	A		B: 580,000 P	+	11
Feral Pigeon *Columba livia*	RB	G		B: 1,300,000 I	?	
Stock Dove *Columba oenas*	RB WV	A		**B: 310,000 T**	+++	2
Woodpigeon *Columba palumbus*	RB WV	G		B: 2,700,000 T	+++	2
Collared Dove *Streptopelia decaocto*	RB	G	1955	B: 800,000 T	+++	2
Turtle Dove *Streptopelia turtur*	MB	R		B: 44,000 T	---	2
* Rose-ringed Parakeet *Psittacula krameri*	RB	-	1971	B: 4,300 I	+++	
Cuckoo *Cuculus canorus*	MB	A		B: 14,000 P	~/---	2
Barn Owl *Tyto alba*	RB	A		B: 4,000 P	--/~	12
* Little Owl *Athene noctua*	RB	-	1879	B: 8,700 P	?-	2
Tawny Owl *Strix aluco*	RB	G		B: 190,000 P	~	2
Long-eared Owl *Asio otus*	RB WV	G		B: 2,400 P	?-	
Short-eared Owl *Asio flammeus*	RB WV	A		B: 2,300 P	--	
Snowy Owl *Bubo scandiacus*	CB	-	1967	B: <1 P		
Eagle Owl *Bubo bubo*	RB	-	1984	B: 1 P		
Nightjar *Caprimulgus europaeus*	MB	R		B: 4,600 M	--/+	12
Swift *Apus apus*	MB	G		B: 110,000 P	?/-	3
Kingfisher *Alcedo atthis*	RB	A		B: 5,700 P	~	4
Bee-eater *Merops apiaster*	CB PV	-	1955	P: 20 I	++	9
Hoopoe *Upupa epops*	CB PV	G		P: 120 I	~	9
Wryneck *Jynx torquilla*	CB PV	R		B: <1 P	---	
				P: 300 I	~	9
Green Woodpecker *Picus viridis*	RB	A		B: 24,000 P	+++	2
Great Spotted Woodpecker *Dendrocopos major*	RB WV	G		B: 41,000 P	+++	2

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

Lesser Spotted Woodpecker *Dendrocopos minor*	RB	R		B: 2,200 P	~/--	1
Woodlark *Lullula arborea*	MB	R		B: 3,100 P	+++	12
Skylark *Alauda arvensis*	RB WV	R		B: 1,700,000 T	--	2
Shorelark *Eremophila alpestris*	CB WV	-	1977	W: 300 I	?	
Sand Martin *Riparia riparia*	MB	A		B: 70,000 P	~	4
Swallow *Hirundo rustica*	MB	A		B: 780,000 T	~	2
House Martin *Delichon urbicum*	MB	A		B: 420,000 P	--	2
Tree Pipit *Anthus trivialis*	MB	A		B: 75,000 T	~/---	2
Meadow Pipit *Anthus pratensis*	RB WV	A		B: 1,600,000 T	--	2
Rock Pipit *Anthus petrosus*	RB WV	G		B: 34,000 P	?-	
Water Pipit *Anthus spinoletta*	WV	G		W: <100 I	+	
Yellow Wagtail *Motacilla flava*	MB	A		B: 19,000 T	--	2
Grey Wagtail *Motacilla cinerea*	RB	A		B: 60,000 P	~	4
Pied Wagtail *Motacilla alba*	RB PV	G		B: 470,000 T	++/~	2
Waxwing *Bombycilla garrulus*	WV	G		W: 100 I	?	
Dipper *Cinclus cinclus*	RB	G		B: 13,000 P	~	4
Wren *Troglodytes troglodytes*	RB	G		B: 8,000,000 T	++	2
Dunnock *Prunella modularis*	RB WV	A		B: 1,800,000 T	-/~	2
Robin *Erithacus rubecula*	RB WV	G		B: 5,500,000 T	~/++	2
Nightingale *Luscinia megarhynchos*	MB	A		B: 6,700 M	~	2
Bluethroat *Luscinia svecica*	CB PV	A	1968	P: 80 I	?	9
Black Redstart *Phoenicurus ochruros*	RB WV	A	1923	B: 50 P	++/-	8
Redstart *Phoenicurus phoenicurus*	MB	A		B: 100,000 P	~	10
Whinchat *Saxicola rubetra*	MB	G		B: 21,000 P	---	3
Stonechat *Saxicola torquatus*	RB	A		B: 15,000 P	--/+	3
Wheatear *Oenanthe oenanthe*	MB	G		B: 550,000 I	-	3
Ring Ouzel *Turdus torquatus*	MB	R		B: 6,900 P	--	12
Blackbird *Turdus merula*	RB WV	G		B: 4,800,000 T	-	2
Fieldfare *Turdus pilaris*	CB WV	A	1967	W: 680,000 I	?~	5
Song Thrush *Turdus philomelos*	RB WV	R		B: 1,000,000 T	--	2
Redwing *Turdus iliacus*	RB WV	A	1932	B: 60 P	~	8
				W: 650,000 I	?~	5
Mistle Thrush *Turdus viscivorus*	RB WV	A		B: 250,000 T	-	2
Cetti's Warbler *Cettia cetti*	RB	G	1972	B: 650 M	+++	8
Grasshopper Warbler *Locustella naevia*	MB	R		B: 11,000 P	--/~	3
Savi's Warbler *Locustella luscinioides*	CB	R	1960†	B: <10 P	++/---	8
Aquatic Warbler *Acrocephalus paludicola*	PV	R		P: 30 I?	~	9
Sedge Warbler *Acrocephalus schoenobaenus*	MB	G		B: 300,000 T	~	4
Marsh Warbler *Acrocephalus palustris*	MB	R		B: 30 P	---	8
Reed Warbler *Acrocephalus scirpaceus*	MB	G		B: 91,000 P	?+	2
Icterine Warbler *Hippolais icterina*	CB PV	G	1992	P: 70 I	~	9
Dartford Warbler *Sylvia undata*	RB	A		B: 3,200 P	+++	12
Barred Warbler *Sylvia nisoria*	PV	-		P: 200 I	+	9
Lesser Whitethroat *Sylvia curruca*	MB	G		B: 64,000 T	~	2
Whitethroat *Sylvia communis*	MB	G		B: 930,000 T	---/++	2
Garden Warbler *Sylvia borin*	MB	G		B: 190,000 T	~	2
Blackcap *Sylvia atricapilla*	MB WV	G		B: 920,000 T	+++	2
Pallas' Warbler *Phylloscopus proregulus*	PV	-		P: 110 I	+++	9
Yellow-browed Warbler *Phyll. inornatus*	PV	-		P: 430 I	+++	9
Wood Warbler *Phylloscopus sibilatrix*	MB	A		B: 17,200 M	~/--	3
Chiffchaff *Phylloscopus collybita*	MB WV	G		B: 750,000 T	+	2
Willow Warbler *Phylloscopus trochilus*	MB	A		B: 2,000,000 T	~/--	2
Goldcrest *Regulus regulus*	RB WV	A		B: 770,000 T	~	2
Firecrest *Regulus ignicapilla*	RB WV	A	1962	B: 170 M	++	8
Spotted Flycatcher *Muscicapa striata*	MB	R		B: 128,000 T	---	2
Red-breasted Flycatcher *Ficedula parva*	PV	-		P: 100 I	+	9

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

Pied Flycatcher *Ficedula hypoleuca*	MB	G		B: 38,000 P	+/-	3
Bearded Tit *Panurus biarmicus*	RB	A		B: 500 P	+++/~	10
Long-tailed Tit *Aegithalos caudatus*	RB	G		B: 260,000 T	++	2
Marsh Tit *Poecile palustris*	RB	R		B: 53,000 T	--	2
Willow Tit *Poecile montana*	RB	R		B: 8,500 T	---	2
Crested Tit *Lophophanes cristatus*	RB	G		B: 2,400 P	?+	10
Coal Tit *Periparus ater*	RB	G		B: 600,000 T	++/~	2
Blue Tit *Cyanistes caeruleus*	RB	G		B: 3,300,000 T	+	2
Great Tit *Parus major*	RB	G		B: 2,000,000 T	++	2
Nuthatch *Sitta europaea*	RB	G		B: 140,000 T	+++	2
Treecreeper *Certhia familiaris*	RB	G		B: 200,000 T	~	2
Golden Oriole *Oriolus oriolus*	MB	A		B: <10 P	++/--	8
Red-backed Shrike *Lanius collurio*	CB	R		B: <1 P	---	8
				P: 200 I	-	9
Great Grey Shrike *Lanius excubitor*	WV	-		W: 100 I	-	9
Jay *Garrulus glandarius*	RB WV	G		B: 160,000 T	~	2
Magpie *Pica pica*	RB	G		B: 600,000 T	++/~	2
Chough *Pyrrhocorax pyrrhocorax*	RB	A		B: 450 P	++	12
Jackdaw *Corvus monedula*	RB WV	G		B: 1,000,000 T	++	2
Rook *Corvus frugilegus*	RB WV	G		B: 1,200,000 P	+	3
Carrion Crow *Corvus corone*	RB	G		B: 790,000 T	+++	2
Hooded Crow *Corvus cornix*	RB WV	-		B: 160,000 T	-	
Raven *Corvus corax*	RB	G		B: 12,000 P	?~	3
Starling *Sturnus vulgaris*	RB WV	R		B: 3,000,000 P	---	2
House Sparrow *Passer domesticus*	RB	R		B: 4,700,000 P	---	2
Tree Sparrow *Passer montanus*	RB	R		B: 68,000 T	---	2
Chaffinch *Fringilla coelebs*	RB WV	G		B: 5,600,000 T	+	2
Brambling *Fringilla montifringilla*	CB WV	G	1920	W: 920,000 I	?+	5
Serin *Serinus serinus*	CB PV	A	1967	P: 50 I	+++	9
Greenfinch *Carduelis chloris*	RB WV	G		B: 1,800,000 T	+	2
Goldfinch *Carduelis carduelis*	RB	G		B: 900,000 T	~	2
Siskin *Carduelis spinus*	RB WV	G		B: 360,000 T	++/?~	3
Linnet *Carduelis cannabina*	RB WV	R		B: 540,000 T	--	2
Twite *Carduelis flavirostris*	RB WV	R		B: 10,000 P	--	12
Lesser Redpoll *Carduelis cabaret*	RB	A		B: 25,000 P	---	2
Common Redpoll *Carduelis flammea*	CB WV	G		?		
Crossbill *Loxia curvirostra*	RB WV	G		B: 10,000 P	~	
Scottish Crossbill *Loxia scotica*	RB	R		**B: 780 P**	?+	
Parrot Crossbill *Loxia pytyopsittacus*	RB	A	1984	B: 30 P	?	
Scarlet Rosefinch *Carpodacus erythrinus*	CB PV	A	1982	P: 150 I	+++	9
Bullfinch *Pyrrhula pyrrhula*	RB	R		B: 160,000 T	--	2
Hawfinch *Coccothraustes coccothraustes*	RB	A		B: 4,800 P	~/--	12
Lapland Bunting *Calcarius lapponicus*	CB WV	G	1977	W: 350 I	~	
Snow Bunting *Plectrophenax nivalis*	RB WV	A		B: 90 P	++/-	8
				W: 11,000 I	-	
Yellowhammer *Emberiza citrinella*	RB WV	R		B: 790,000 T	--	2
Cirl Bunting *Emberiza cirlus*	RB	R		B: 710 P	---/++	10
Ortolan Bunting *Emberiza hortulana*	PV	-		P: 60 I	~	9
Little Bunting *Emberiza pusilla*	PV	-		P: 30 I	++	9
Reed Bunting *Emberiza schoeniclus*	RB WV	R		B: 190,000 T	+/--	2
Corn Bunting *Emberiza calandra*	RB	R		B: 10,000 T	---	2

† Had bred in historical times

From: *Silent Summer: the state of wildlife in Britain and Ireland*
N.Maclean (ed) Cambridge University Press, pp 281-318.

[1] RB: Resident Breeder, MB: Migrant Breeder, CB: Casual Breeder, PV: Passage Visitor, SV: Scarce Visitor, WV: Winter Visitor

[2] I: individuals, P: pairs, F: Females, M: males, N: nests, T: territories, counts relate to breeding (B), passage (P) or winter (W) seasons.

[3] Source for trend information: 1 - Common Birds Census; 2 - Common Birds Census/Breeding Bird Survey; 3 – Breeding Bird Survey/Gibbons et al. (1993); 4 – Waterways Bird Census; 5 – Garden Bird Feeding Survey (Chamberlain et al. 2006); 6 –Wetland Bird Survey; 7 - Game and Wildlife Conservancy Trust Game Bag Counts (Tapper et al. 1992); 8 – Rare Breeding Birds Panel; 9 – Fraser et al. (2007); 10 – RSPB data; 11 – Mitchell et al. (2004); 12 - Species specific surveys; 13 – British Birds Rarities Committee; 14 – Winter Gull Survey (Banks et al. 2009).