



Birds reacting to climate change

Average global temperatures rose by 0.74°C over the period 1906–2005. The average warming was greater in northerly latitudes, and more pronounced on land than at sea. Spring is arriving earlier in many regions, while the ranges of plants and animals are gradually shifting northwards, and in mountainous regions also upwards. Such impacts often become evident rapidly among birds. Since they are also widely studied, this makes birds good bio-indicators of climatic warming.

Research conducted for the recently published Climatic Atlas of European Breeding Birds indicates that by the end of the century birds' ranges could shift by some 550 km in a northeasterly direction, and shrink by about a fifth. Species will have to adapt, move to new areas, or vanish. Migration distances may well become shorter and many birds will stay longer in their breeding areas. More birds will stay for the winter in northerly regions, and some current migrants may become sedentary or partially sedentary, while remaining able to react rapidly to changes in weather conditions and food supply. The numbers of greenfinches (*Carduelis chloris*) spending the winter in Finland have increased, for instance, while the numbers migrating to winter in Germany have correspondingly declined.

According to climate envelope models, several bird species could eventually disappear from the Nordic region altogether. More than 20 species are expected to vanish from Finland – about a tenth of all breeding species – while many species currently breeding in the whole country might only breed in Northern Finland in the future. In Denmark some 35–40 species are expected to disappear over the next 80 years, but a similar number of new species are expected to move to Denmark. The European regions with the highest numbers of breeding bird species will shift from eastern parts of Central Europe towards the Baltic Countries and Southern Finland.

The birds most threatened by climate change are arctic and high alpine species, such as the ivory gull (*Pagophila eburnea*) and dunlin (*Calidris alpina* subsp. *alpina*). These species depend on arctic or alpine habitats that become rarer as climate change proceeds and the arctic sea ice and palsa mires melt and tundra ecosystems change into boreal forests. Replacing species will move in from the south, but the arctic and alpine species may be lost forever.

A new Finnish study shows that birds of the northern forests, mires and fells like the Siberian tit (*Parus cinctus*) and jack snipe (*Lymnocyptes minimus*) are particularly threatened with extinction, since climate models show they will lose most of their habitat due to climate change, and the Arctic Ocean forms a natural barrier for the northward movement of the species.

Adapting to changing conditions

The behaviour of migratory birds follows seasonal rhythms as they seek out the most favourable conditions for the various stages of their annual cycle: moulting, migrating, and overwintering, so as to be successful in their reproduction. As highly mobile and warm-blooded creatures they can readily adapt to changes in the climate and their habitats by adjusting their seasonal movements.

The earlier spring means that plants start to grow sooner and insects appear earlier. This enables migrating birds to return north and start nesting sooner, improving many species' early breeding success rates. For nesting to succeed and young fledglings to survive, however, conditions must also be favourable in early summer. Experts have noted that climate change seems to be asymmetric, with warmer spring temperatures not reflected in corresponding increases in early summer.

Breeding success rates are determined by the availability of food before and during the nesting season, and birds can suffer if their spring migration and nesting seasons do not shift in step with crucial changes in the growing season or the occurrence of insects. If they arrive when food is in short supply, birds will lay fewer eggs or none at all.

Shore birds face rising tides

More than 20 species of waders (*Charadriidae*) breed in the Nordic Countries. Many of the species are long-distance migrants wintering south of the Equator. Knots (*Calidris canutus canutus*), for instance migrate twice a year between Siberia and the coasts of Africa over Finland and Norway. The changes occurring due to climatic warming in their arctic tundra breeding habitats are not necessarily all negative, but they may result in mismatches between the timing of their arrival and conditions in their breeding areas.

Many waders depend on shallow coastal areas, such as tidal flats and salt-marshes, as their feeding and roosting sites during migration and in their wintering areas. But as the sea-level is expected to rise, these coastal habitats could disappear. In the Danish waters of the Wadden Sea, which are a very important staging area for many waders, the average sea-level has risen by 0.14 m over the last 35 years. It is expected to rise by almost 0.5 metres more by 2100. This seriously threatens salt-marsh habitats around the Baltic Sea.



According to research conducted in northwest Iceland, the nesting of common eiders (*Somateria mollissima*) is negatively affected by extreme weather conditions such as wet, windy winters, which are expected to become more common as a result of climate change. Picture: Jorma Tenovuo

Climatic warming can increase the competition for resources between sedentary birds and migrants if their nesting times become closer, and if their populations increase. Resident great tits (*Parus major*) and migrant pied flycatchers (*Ficedula hypoleuca*) returning from sub-Saharan Africa may increasingly compete for the same nest sites, if their nesting times coincide.

Climatic warming must be fought

The need to minimise the impacts of climatic warming on northern habitats and their unique species is an important reason to act to mitigate climate change. Climatic warming can seriously affect the birds of the Nordic Countries both in their breeding areas and along their migration routes through changes in their food supply and conditions for migrating, feeding and breeding. Birds' breeding, wintering and roosting areas must be protected, and the viability of their populations in their present distribution areas must be safeguarded.

The black grouse – a sedentary bird species

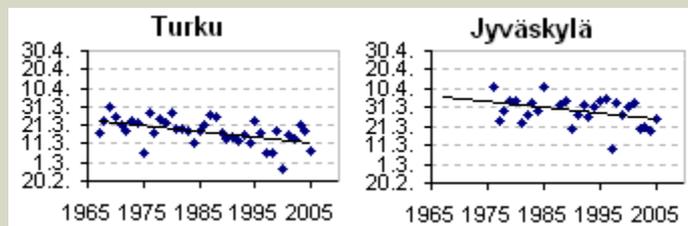
A warming in the climate could greatly affect populations of black grouse (*Tetrao tetrix*) and other galliformes. Observations indicate that several species already deviate from the most favourable conditions for their breeding. This so called mismatching phenomenon can lead to reductions in their numbers and the disappearance of cyclical trends in their populations.

The long-term monitoring of black grouse in Central Finland has revealed that the birds have been performing their courtship displays, mating and hatching their young ever earlier over the last 40 years as the springs have become warmer. But since the early summers have not been getting correspondingly warmer, their young have been hatching in unfavourable conditions, leading to high mortality rates. The species' numbers have consequently dwindled, even though adult mortality rates have not increased.

The black grouse is still common in Finland, Sweden and Norway, but in addition to climatic warming the species is also suffering from increases in predator populations. The black grouse went extinct in Denmark a decade ago. Experts from Birdlife Finland have predicted that the black grouse may be one of many northern species to vanish from Southern Finland due to climate change.

The chaffinch – a short-distance migrant

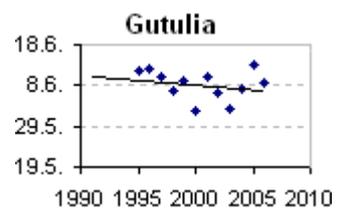
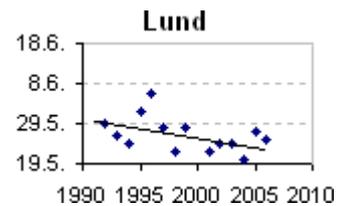
In the Nordic Countries chaffinches (*Fringilla coelebs*) are mainly short-distance migrants, wintering in Central Europe and Denmark. In recent times chaffinches have begun to return to their breeding areas in Norway, Sweden and Finland earlier in the spring due to climatic warming. The chaffinches now arrive 8 days sooner than 20 years ago, but other bird species have advanced their arrivals even more. In Finland chaffinches have particularly been noted arriving earlier in coastal areas. The earlier arrival does not necessarily mean that they start breeding sooner, however.



First spring arrivals of the chaffinch in two different parts of Finland 1964–2007, in Turku on the southwest coast and Jyväskylä in Central Finland. Source: Esa Lehikoinen, Turku university, observation data of birdwatching organisations.

The pied flycatcher – a long-distance migrant

Close links have been observed in Norway between spring temperatures, the arrival of migrant pied flycatchers, and the timing of the birds' egg-laying. Particularly during the warm springs over the last ten years the flycatchers seem to have been nesting slightly earlier than previously, in step with the earlier availability of their insect food and the growth of vegetation. Pied flycatchers strive to nest and lay their eggs as early as possible, to give their young enough time to mature before the autumn migration.



Pied flycatchers breeding earlier in Lund in Southern and Gutulia in Southeastern Norway. Source: Direktoratet for naturforvaltning.



Pied flycatcher. Picture: Jorma Tenovuo

All references are listed on the homepage of the fact sheet: www.environment.fi/nordicnature > Fact sheets > Birds reacting to climate change.