

Wildlife at the time of climate change



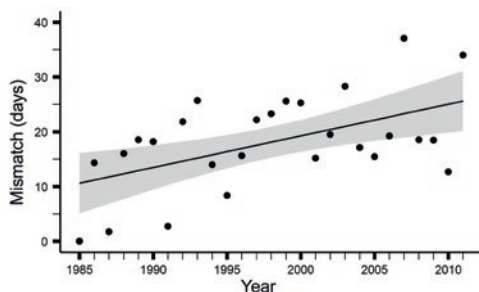
Wildlife at the time of climate change

Roe deer

Decreased survival of fawns: an impossible adaptation?

The strong reproduction capacity of roe deer has facilitated the recent restocking of European forests. In synchrony with the photoperiod, roe deer females give birth during the vegetation regrowth period, which is dependent on temperatures. Does climate change disturb this equilibrium?

A 2014 study showed that there has been little evolution in birth dates since thirty years whereas the onset of spring is increasingly early. In the forests, fawns are therefore born in increasingly unfavourable conditions and their average survival is reduced. This is an important risk for the future of these populations, whose adaptation potential is still unknown.



Relative trend of the mismatch between the timing of fawns' birth and that of flowering in the vineyards in Champagne (indicator of spring vegetation flush)

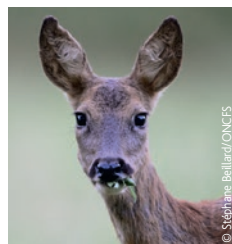
References: Klein F. *et al.* (2014), Le chevreuil face aux changements climatiques : une adaptation impossible ? *Faune Sauvage* 303 : 29-35 ; Plard F. *et al.* (2014), Mismatch between birth date and vegetation phenology slows the demography of roe deer, *Plos Biology* 12(4)

Alpine ibex

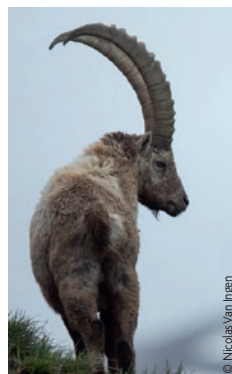
Warmth in high mountains: males and females suffer as a result

Ibex males warm up easily during the autumn rut. The horn blows resonate and the better armed wins. But climate change could change that. An analysis of the trend in the size of horns since twenty years showed that they grow less well in years with a warm spring. The horns of a male born in such a year will always remain smaller than the others: -7 cm for 2 °C more.

The females suffer differently from heat. Whereas the earliness of food abundance in warm springs increases the survival of the young, the females survive less well and undergo more abortions during the following winter. Indeed, a summer that is too hot decreases the resources and prevents the females from building up reserves.



© Stéphane Bellard / ONCFS



© Nicolas Van Ingen

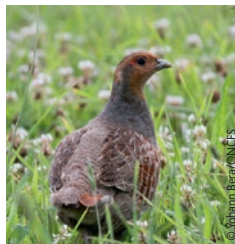
Grey partridge

When the weather becomes unusual, reproduction is thrown into a turmoil

The grey partridge's breeding success is known for its good and bad years, but these fluctuations seem to be increasing. Several consecutive years of bad reproduction, related to unfavourable weather, give rise to concern. This has been demonstrated by a retrospective analysis over a period of thirty-three years: the cool and rainy years are bad for reproduction.

Not only that: the breeding success of the grey partridge is increasingly variable from one year to the next. 70 % of the years were classified as either very good or very bad reproduction years between 2004 and 2013, against only 20 % between 1994 and 2003. Most of the hypotheses to explain this phenomenon have a common point: the weather. Accounting for this increased variability of reproduction in a dynamic population model shows that it fragilises the populations.

References: Bro E. & Reitz F. (2014), Mauvais succès reproducteur à répétition : quelle est la part de responsabilité de la météo ? *Faune Sauvage* 302 : 49-50

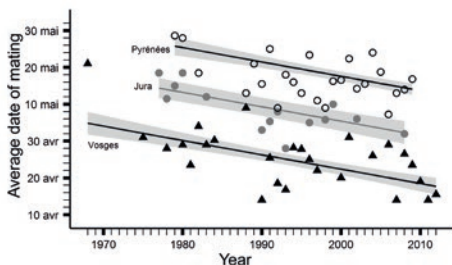
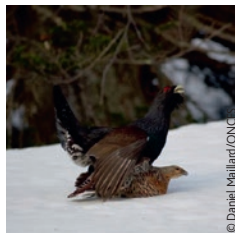


Western capercaillie

Advance of the nesting dates by eleven days in thirty years

The nuptial display of the western capercaillie is a sight which attracts many naturalists in spring. Thanks to these nature lovers and through the systematic surveys organised by the Mountain Galliform Observatory, the mating observation dates are recorded since the end of the 1970s in the Jura, the Vosges and the Pyrenees.

The analysis of mating dates is clear: the western capercaillie breed eleven days earlier than thirty years ago. This figure confirms those obtained in Scotland on other populations, and in Finland on the black grouse. The consequences are less obvious: the early-breeding years were rather favourable for breeding success in the Jura, but unfavourable in Scotland.



Average observation date of western capercaillie mating between 1968 and 2012 in the Pyrenees, Jura and Vosges

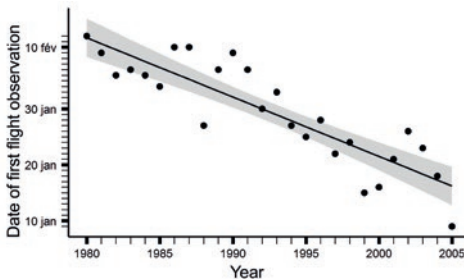
References: Ménoni *et al.* (2012), Change in mating and breeding time of the Capercaillie in France, in relation to the change of the phenology of spring vegetation : XII International Symposium on Grouse, Matsumoto

Greylag goose

An increasingly early spring migration

The greylag geese observed in France are known for their migratory flights coming from Scandinavia from September and moving up from Spain at the end of January-early February.

End of January-early February did you say? Since 1980, public agents, hunters and naturalists (they all participated) have noted the sightings of these migratory birds in spring. The date on which the first migratory flight is observed is particularly revealing: in twenty-six years, the return migration has advanced by twenty-six days. A deterioration of wintering conditions in Spain as well as improved conditions in the North could explain this phenomenon. At this stage, the influence of climate change cannot be distinguished from that of environment management practices.



Dates on which the first flight was observed for goose spring migration over west-central France

References: Fouquet *et al.* (2009), Greylag Geese Anser anser depart earlier in spring: an analysis of goose migration from western France over the years 1980-2005, *Wildfowl* 59 : 143-151

Mallard duck

It stays warm in the north of Europe

Unlike humans whose air traffic is growing rapidly, mallard ducks, longstanding migrants between the north and the south of Europe, have decided to settle.



This has been clearly shown by a long temporal series of capture and ringing: whereas between 1950 and 1978, these birds were on average recovered at 417 km to the north-east of their ringing site, this distance was only 74 km between 2002 and 2013.

Between two hypotheses on the attractiveness of Camargue or the hybridisation with released ducks, the effect of climate change appears. Hence, the migratory mallard ducks from northern Europe seem to no longer move south to winter in Camargue to the extent that they once did. The nesting birds of Camargue, rather sedentary, would therefore represent an increasing proportion of the population.

References: Guillemain *et al.* (sous presse), Becoming more sedentary? Changes in recovery positions of Mallard *Anas platyrhynchos* ringed in the Camargue, France, over the last 50 years, *Wildfowl*

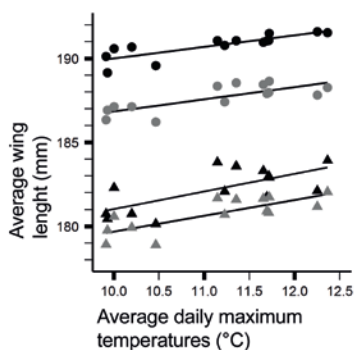
Eurasian teal

When the High North becomes liveable

The Camargue is an important wintering area for migratory birds. Hence, the Eurasian teal breeds in the north of Europe and moves towards the south for the winter. At the Tour du Valat (Bouches-du-Rhône) close to 60 000 teals were ringed and measured between 1952 and 1978.

The results of analyses of these data in 2005 may seem surprising: the teals are larger in the warm years. Of course, teals do not grow with the temperature, but some individuals may change their migratory behaviour: small teals may be forced to move further south to the Camargue only in the cold years.

Global warming of the climate may therefore influence the distribution of Eurasian teal in Europe: an increasing number of birds could remain in the north of Europe in winter.



Average wing size for males (points) and females (triangles), adults (black) and juveniles (grey) as a function of average daily maximum temperatures.

References: Guillemain *et al.*, (2005) Long-term climatic trend and body size variation in teal *Anas crecca*, *Wildlife Biology* 11:81-88



Teal capture
by agents
of ONCFS

Context of climate change

Global changes including land-use and climate change, are a major threat to biodiversity. As emphasised in the last reports of the IPCC (Intergovernmental Panel on Climate Change) climate change induces both an increase in the average temperature (which causes earlier springs), a modification of the precipitation regime, and an increase in the frequency and intensity of extreme weather events.

Detecting the impact of climate change on wildlife is therefore a difficult undertaking. Indeed, these studies require decades of rigorous monitoring of populations and biological traits that are sensitive to environmental changes. The latter can be manifold: breeding success, morphology, behaviour, reproduction and migration phenology. And when it has been possible to characterise a trend, the role of climate must be distinguished from that of other factors.

Results of wildlife monitoring at ONCFS

It is through the monitoring of mammals and birds set up since over thirty years that ONCFS was able to collect, centralise and analyse the data presented here. Such extensive work can only be achieved in partnership with many players: hunters, naturalists, managers and citizens have played a key role in these studies.

This selection of scientific studies brings together a wide variety of possible responses to climate change: adaptation of the species (graylag goose) or not (roe deer), gradual influence of the average temperature (Eurasian teal) or concrete effects of the generalisation of so-called extreme events (grey partridge), modification of behaviour (western capercaillie, mallard duck) or morphology (ibex).

The results presented here are derived from research, ongoing or published in international scientific journals, in partnership with renowned scientific organisations.

Contact

ONCFS
Research and Expertise Department
dre@oncfs.gouv.fr

Direction générale

85 bis, avenue de Wagram
75017 Paris
Tél. : 01 44 15 17 17

For more information

www.oncfs.gouv.fr