Predictions from Biodiversity Climate Change Impacts Report Card 2015

Abridged and edited by Steve Head

We strongly advise you read the original document which includes three levels of confidence in the individual predictions, and notes on whether new data are causing prediction confidence to rise. Low confidence predictions are still important because they may reflect the first evidence of future trends. http://www.nerc.ac.uk/research/partnerships/ride/lwec/report-cards/biodiversity/

This summary leaves out most of the low confidence predictions, and those of medium confidence which apply to habitats (such as marine) of lesser interest to wildlife gardeners. The Letters **H**,**M** (and one **L** for low) indicate confidence set by the authors of the Report Card. Groupings are simplified from the original

Timing

Many spring life-cycle events (emergence, leaf burst, breeding etc) are likely to be earlier in the future **H**

This, with extended autumn life-cycle events (longer feeding period, more sunlight etc) may allow some species (e.g. aphids and butterflies) to increase the number of generations in a year, and increases in plant productivity, so long other factors are not limiting. **M**

Ranges

Species are likely to continue to shift their distribution northwards and to high altitudes in response to increasing temperatures, but subject to effects of species interactions and competition. **H**

Species unable to shift distribution to keep pace with climate change may experience reduction in their range, and local extinction. Species isolated or in fragmented habitats and those with slow rates of dispersal and low reproductive rates will be vulnerable. **M**

Because there are more species with northern range margins than southern ones in the UK, more species may increase than decrease in this country. **M**

Expanding species will tend to be those with a relatively warm, southerly distribution (e.g. the Dartford warbler and the Adonis blue butterfly). Species for which areas of suitable climate are likely to contract are those typically found in cold areas, including the common scoter and arctic-montane bryophytes and lichens. **M**

The threats posed by existing and new non-native invasive species, pests and diseases will increase in future as the climate becomes suitable for larger numbers of species. **M**

New species

Colonisation by new plant species may lead to insects and other invertebrates using different species; this has been observed in gardens with cultivated plants. **L** (an example would be the elephant hawk moth and Fuchsia)

Wetlands and ponds
Reduced summer rainfall would adversely affect many wetland habitats, such as lowland fens in South East England. **M**

Indirect climate changes that lead to greater nitrogen deposition and eutrophication in freshwater systems will be more important than direct temperature increases unless these are very large. **H**

Through increased flooding and increased drought, climate change may have positive effects in maintaining pond biodiversity, but permanent ponds may become temporary. **M**

Shallow-water bodies may experience rapid temperature increases during periods of hot weather, which may lead to oxygen depletion and blooms of cyanobacteria (blue-green 'algae'). **M**

Trees and woodland
Lowland beech woodland and wet woodland would be adversely affected by more frequent or more extreme summer drought in the drier parts of the UK. **M**

Existing and new pests and diseases represent a major threat to trees and woodland. These threats may be increased by interactions with the direct effects of climate change on tree function. **M**

Vertebrates
Many UK bird species will be affected by changes in the abundance and availability of prey through changes in summer rainfall and soil moisture. **M**

Because of the dependence of many migratory bird species on wetland habitats, they may be affected by projected trends of reduced summer rainfall and lower water tables. **M**

In the lowlands, there is likely to be a decline in cold-water salmonids (eg trout) and an increase in warm-water cyprinids (e.g. the carp) that reproduce earlier. In particular, the carp is likely to expand its range northwards and breed more effectively. **H**

Mammals vary in their ability to respond to current average and extreme climatic conditions, and will show variable responses to climate change in the future. **H**

Young mammals are vulnerable to extreme events (e.g. spring drought, flooding and cold winters) which may then impact their populations. **M**

Bats do better in wetter summers associated with greater insect abundance , but drier springs and summers have a negative effect. **M**

Warmer winters may interfere with hibernation in hedgehogs, dormice and bats, reducing body condition, breeding success and survival rates. **M**

Non-hibernating mammals, including red deer, Soay sheep, badgers, rodents, rabbits and hares, will benefit from warmer winters. **M**

Invertebrates
Although areas of climate suitability might increase for some species, not all species will be able to change distribution with changing climate, particularly in fragmented landscapes. **M**

Some invertebrate species may be able to adapt their habitat use through behavioural or evolutionary processes. As temperatures increase, warmth-loving species (such as the silver-spotted skipper) may no longer need sparse or short vegetation, and taller vegetation providing cooler, shaded microclimates may become suitable. **M**

Plants
Montane and arctic-alpine plant species are threatened by climate change as more warmth-loving species colonise these habitats. **H**

Warmer winters will benefit many plant species, increasing their abundance and allowing expansion into new areas. However, for some other species, winter warming will offset advances in spring green-up as winter chill requirements are not met for flower or seed development, reducing reproductive success. **M**

Long-lived perennial plants dominate the UK flora and this means that climate change impacts and measurable changes in population sizes and geographic distributions take many years to be reflected in the adult population. **M**

Climate change will increase the number of potential plant diseases due to a northward range expansion of pathogenic organisms and their vectors. **H**

Climate change will increase the suitability of the UK climate for a number of non-native forest pathogens (including ones that affect a wide range of native plant species), such as thermophilic (warmth-loving) rust fungi. **H**

Soils
Climate-driven changes in the diversity and structure of soil communities will affect soil processes and physical properties (e.g. its porosity, which is increased by the action of earthworms). **H**

Changes in climate have the potential to increase or decrease carbon storage and sequestration, depending on local circumstances, timescale and the relative importance of rising temperatures and other aspects of climate. **H**

Range shift and species colonisation are likely to give rise to novel combinations of species and complex changes in food web interactions between, for example, plant species and herbivores, parasites and hosts. **M**

Further changes in climate will increase the risk of a breakdown in the synchrony between different species' life-cycle events. Food chain mismatches are most likely in highly seasonal species that depend on a synchronised food peak; the link between abundance of caterpillars and the reproductive success of woodland birds is one example of the importance of such synchrony. **M**

Evolutionary (genetic) adaptation to climate change will allow some populations to persist where the climate would otherwise become unsuitable, or to colonise new areas. **M**

Heavily fragmented landscapes that reduce gene flow between populations will hamper genetic adaptation to new conditions even in some widespread species. **M**