



## 5.3 Invasive species and diseases

Invasive species and disease can have significant effects upon the natural environment, affecting the existence or integrity of some species and habitats. For example, the native red squirrel *Sciurus vulgaris* is threatened by disease carried by the invasive grey squirrel *Sciurus carolinensis*. Freshwater habitats are particularly vulnerable where, for example, vigorous invasive plants such as Japanese knotweed *Fallopia japonica* can reduce biodiversity. Diseases such as foot and mouth have effects on livelihoods and ecosystems and can disrupt public access. The effects of climate change will be to increase the risks from new invasive species and diseases affecting the natural environment, and to alter the risks associated with existing invasive species and diseases.

### 5.3.1 The current situation

#### 5.3.1.1 Invasive species

Non-native species have been introduced to England over thousands of years, either deliberately for social or economic reasons such as forestry, agriculture and horticulture, or by accident: for example Dutch elm disease *Ceratomyces ulmi* was introduced in imported timber. Most non-native species are benign and only a small proportion becomes invasive, although why some do so and others do not is unclear. It is also not well understood why some introduced species, present for many years at low levels, subsequently expand rapidly and become invasive.

#### 5.3.1.2 Diseases

A large number of diseases can affect plant and animal biodiversity. Examples of those posing a direct risk include squirrel poxvirus, crayfish plague, bluetongue and avian influenza:

- A study of squirrel poxvirus infection in red and grey squirrels (Sainsbury *et al.* 2000) showed that 61% of apparently healthy grey squirrels have been exposed to the virus. In contrast, only 3% of red squirrels were found to have antibody to it, but 75% of those with the antibody showed clinical signs of squirrel poxvirus-associated disease. This suggests that the virus causes little or no disease in greys, but is highly pathogenic for reds. In addition, the study found evidence that the highest risk of the virus affecting red squirrel is in areas currently shared with grey squirrels.
- The invasive non-native signal crayfish *Pacifastacus leniusculus* is displacing the native white-clawed crayfish *Austropotamobius pallipes* by carrying the fungal crayfish plague, to which the native species is susceptible (eg Alderman 1993).
- The first case of bluetongue disease in the UK was detected in September 2007 and it began circulating between the local animal and midge population in East Anglia. The disease has now spread to other parts of southern and eastern England.
- Avian influenza reached the UK in April 2006 but, since then, only a few isolated cases in wild birds and poultry have been detected.

### 5.3.2 Implications for the natural environment

#### 5.3.2.1 Invasive species

Invasive non-native species have an impact on biodiversity by displacing or preying upon native species, by destroying habitats, or by introducing new diseases or parasites. The most direct implications are the threats of predation on, and competition with, native species. For example, water voles *Arvicola terrestris* have declined as a direct result of predation from invasive non-native mink *Mustela vison*. Ground-nesting birds and seabird colonies can be damaged by predation from non-native species, especially on islands. The slipper limpet *Crepidula fornicata* (pictured) is an example of an invasive marine species that modifies the local environment by allowing mud deposition through faecal accumulation, making it less favourable for other native species and having an economic effect on commercial oyster beds.

Invasive non-native species can also affect ecosystems more widely. River catchments are particularly vulnerable to invasive aquatic species: these include signal crayfish and Australian swamp stonecrop *Crassula helmsii*. Along riverbanks, dense monocultures of plants such as Himalayan balsam *Impatiens glandulifera* and Japanese knotweed can crowd out native species, affect the appearance of riverine landscapes, prevent access to riversides, and impede the flow of water thereby exacerbating flood risk. When these invasive species die down in winter, they leave the river banks bare, exposing them to increased soil erosion. In the marine environment, the Chinese mitten crab *Eriocheir sinensis* is a voracious predator threatening many native species. Also, it burrows in soft sediment estuarine banks and, in high densities, can reduce their effectiveness as flood defences.

#### 5.3.2.2 Diseases

In addition to the direct risks to wildlife, the management of disease-carrying organisms can also present indirect risks. For instance, insecticide control of the vectors of Lyme disease and bluetongue may affect non-target terrestrial and aquatic invertebrates. If restrictions are placed on livestock movements or livestock numbers as part of disease control during major outbreaks, such as that of foot and mouth in 2001, changes in grazing regimes can drastically affect terrestrial ecosystems and landscapes as well as farming practices and livelihoods. Such restrictions can also reduce public engagement with the natural environment.

### 5.3.3 Forward look

Climate change is likely to increase the impact of invasive species through:

- more non-native species arriving and becoming established in England;
- those currently restricted to southern England spreading north; and
- both new and established species becoming invasive.

It is also likely that some diseases, or the invasive species that carry them, will spread as seen, for example, with bluetongue: milder winters with fewer consecutive frost-free days, may extend the season of activity of the adult midges that carry the disease and allow its spread, despite control measures. Increasing global trade and movements of people also increase the chances of species reaching and becoming established in England.



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