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Caught in the act – legal regulation of non-native species in England

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Introduction

The Invasive Non-native Species Framework Strategy for Great Britain aims to minimize the risks posed, and negative impacts caused, by invasive non-native species (<https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=99>). It broadly adopts the three-stage approach set out in the Convention on Biological Diversity 1992 (CBD) of prevention, detection/surveillance and control/eradication (Thomas 2010). Prevention, the best and usually the cheapest of these, is the primary concern of much of the related legislation. As part of this, the Strategy involves the development of a robust risk assessment process for species, pathways and habitats. A range of species risk assessments can be viewed on the GB Non-native Species Secretariat's website (<http://www.nonnativespecies.org>).

Obligations to regulate or prohibit the introduction of non-native species are set out in international conventions, such as CBD (article 8(h)) and the Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention', article 11(2)(b)). The Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) regulates international trade in threatened species, or species of conservation concern in at least one country, but does not, generally, deal with species that are likely to become invasive outside their natural range. For EU Member States the regulation of potentially harmful non-native species is enshrined in European law in the Directive on the Conservation of Wild Birds 2009 (article 11) and in the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 1992 (article 22(b)). In domestic British legislation, there is a raft of controls relevant to specific taxonomic groups or biosecurity purposes, such as the Plant Health Act 1967, the Animals and Animal Products (Import and Export) Regulations 2000 and the Prohibition of Keeping or Release of Live Fish (Specified Species) Order 1998. However, the main piece of legislation that aims to protect native biodiversity from release or escape of non-native species into the wild in Great Britain, and implements the provisions of the EU Birds and Habitats Directives, is the Wildlife & Countryside Act 1981. Natural England is the main authority in England responsible for regulating release of non-native species through its licensing powers under this Act (releases of biological control agents, fish, shellfish and aquatic crustaceans are dealt with by the Department for Environment, Food and Rural Affairs: Defra and its agencies).

In 2005 it was reported that there were more than 2700 non-native species recorded in England, 73% of which were flowering plants (Hill *et al.* 2005). However, until recently (April 2010), the prohibition on planting or causing non-native plants to grow in the wild was restricted to a limited number of species, so these were largely unregulated. Of the 700+ animal species recorded, 38 were birds and 20 mammals. Eighteen (42%) of the total of 43 terrestrial mammal species in Britain (excluding bats) recorded by Harris *et al.* (2008) are introduced or feral

species. Any suggestion that it is possible or indeed desirable to eradicate all (or even many) non-native species is clearly unrealistic. Attention needs to be focused on those species that are invasive or potentially invasive. Regulatory effort must operate within this reality and target action and control where it gives the greatest benefit.

Control of release of non-native species

Section 14 of the Wildlife & Countryside Act makes it an offence for anyone to release, or allow to escape into the wild, any animal which ‘*is of a kind which is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state*’, or which is included in Part I of Schedule 9 of the Act, or to plant or cause to grow in the wild certain invasive plants listed in Part II of the Schedule. Note, there is no prohibition on planting, or causing to grow, non-native plants that are not ordinarily resident in a wild state, other than those listed in the Schedule. Schedule 9 lists non-native species that are already present here but whose further spread or release is considered undesirable (a small number of native species are also listed to prevent inappropriate releases). However, because the Act does not define terms such as ‘ordinarily resident’ or ‘in the wild’ there are some difficulties in determining which circumstances or species, other than those listed in the Schedule, would be ‘caught’ by section 14. To try to address this, Defra has recently published guidance on interpretation of some of these terms (Defra 2009). In the absence of case-law, we have to rely on this guidance and taking a sensible approach that is consistent with, and will achieve the objectives of, the legislation.

First, the term ‘of a kind’ has been criticised by some for being unclear or non-scientific. However, in fact this gives the potential for regulation to be exercised at the species, sub-species or lower taxonomic levels, and could prevent inappropriate release, for example, of geographically distinct races even if these are not classed as separate species/sub-species (e.g. the southern clade of the Pool Frog *Pelophylax lessonae* is considered distinct from the native northern clade found in England: Snell *et al.* 2005). The term therefore allows for the prohibition of any animals that differ in some significant way from those already ordinarily resident (Defra 2009) and could, for example, include hybrids of species already present (e.g. hybrids of the Peregrine Falcon *Falco peregrinus* are common in falconry). Far from being a weakness in section 14 this is actually a strength which allows regulation to be focused at the level best suited to protect biodiversity.

The terms ‘ordinarily resident’ and ‘regular visitor’ are more problematic. The prohibition on release of species that are not ‘ordinarily resident’ or a ‘regular visitor’ provides the first line of defence in section 14. Once a species passes this threshold it must be added to Schedule 9 before further release is prohibited – the second line of defence. An ecologically meaningful definition of ‘ordinarily resident’ might appear to be species that occur in self-sustaining populations, corresponding, in the case of birds, with BOU category C species. However, this just does not work for the purposes of regulation. The consultation process and legislative changes involved in amendment of Schedule 9 inevitably mean there is a time-lag in implementing changes, so this would mean that the species that most rapidly establish self-sustaining populations would be the first to escape regulatory control, until such time as Schedule 9 is able to catch up. In other words, the most invasive species would be the least regulated. Earlier legislation, the Destructive Imported Animals Act 1932 (see below), defined a ‘non-indigenous’ (= non-native) mammal, for the purposes of the Act, as a mammal that was not established in a wild state in Great Britain at the date of commencement of the Act ‘*or had only become so established during the preceding 50 years*’. Arguably a similar approach could be usefully applied to the 1981 Act but there is no legal basis in the Act to do so. In the absence of case-law, we will continue to have to rely on reasoned judgement, on a case-by-case basis, consistent with published guidance (Defra 2009) and the precautionary approach set out in the CBD (see <http://www.cbd.int/decisions/?id=7197>).

From an ornithological viewpoint the term ‘regular visitor’ might appear straightforward, at least in relation to seasonal migrants, but the full scope of section 14 has to go beyond this. For example, irruptive species, such as

the Two-barred Crossbill *Loxia leucoptera*, occur quite frequently but not as an annual seasonal migrant. Similarly, some seal species, such as the Hooded Seal *Cystophora cristata*, primarily an Arctic species, often turn up in British waters. Injured Hooded Seals are sometimes taken into ‘rescue centres’ for rehabilitation and it would seem inappropriate to require a licence for the re-release of such species which occur here relatively frequently in the natural course of events.

Finally, what is ‘the wild’ in any case? Again, this seemingly simple concept presents problems when one considers that the main purpose of the legislation is to protect native fauna and flora. An animal released into a fenced enclosure might damage native wildlife within the enclosure even if it itself cannot escape – although this is less of a conundrum for birds, which could fly over the fence anyway. Clearly there needs to be consideration of the size of the enclosure, if there is one, and the nature of the habitats and/or other species present within it, as well as the degree of control retained over the ‘released’ animal and the extent to which it is living as if it were a free-living wild creature. For example, in falconry, where the bird is clearly expected to return, a competent handler exercising due diligence is unlikely to be seen as committing an offence (Defra 2009). ‘The wild’ is therefore about both where the animal is living and how it is living (see Defra 2008). So, for example, for regulatory purposes gamebirds within a rearing pen are usually treated as captive poultry, but once released, as wild birds.

Already established non-native species

Where non-native species are already established in the wild, but are not listed in Schedule 9, the release of further individuals is not prohibited. Where they are listed in Schedule 9 further releases are prohibited, except under licence. So the release of Common Pheasants *Phasianus colchicus* is not regulated, but that of the Golden Pheasant *Chrysolophus pictus*, which is on the Schedule, is, although both species are in BOU category C1 (Dudley 2005; <http://www.bou.org.uk/thebritishlist/British%20List%202010%2008%2031.pdf>). By using the licensing powers provided in section 16 of the Act we can regulate the release of listed species by limiting numbers to be released, location of release and any other conditions appropriate to control their impact or, of course, refuse a licence, but we have no control over those that are not listed. The kind of licences that may be issued are, typically, for research purposes or for rehabilitation of limited numbers of animals, where the release of small numbers would have no significant impact on biodiversity or other interests.

Unlike mammals and other taxonomic groups, all wild birds are protected under the Wildlife and Countryside Act 1981. Section 27 of the Act defines a wild bird as ‘any bird of a species which is ordinarily resident in or is a visitor to the European territory of any Member State in a wild state’. So, the default position is that even invasive non-native bird species are afforded full legal protection. This includes species identified as potential future threats, such as the Sacred Ibis *Threskiornis aethiopicus* and the House Crow *Corvus splendens* (see risk assessments for these species at <https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?pageid=143>) that are not yet present in the UK, but are established elsewhere in the EU. To manage problems caused by non-native birds it is necessary to utilize the licensing powers in section 16 of the Act, including the provision to issue ‘general’ licences to permit lethal control. These are legal derogations issued pre-emptively to allow any person satisfying certain criteria to carry out otherwise unlawful activities, and are used to permit the management of species that are otherwise protected. Until recently, the only non-native species listed on the general licences, for killing or taking the birds themselves or destroying their nests or eggs, were the Greater Canada Goose *Branta canadensis* and the Ruddy Duck *Oxyura jamaicensis*. The latter is subject to an eradication campaign (Henderson 2009, 2010). Following a recent public consultation (Natural England 2009) we extended the use of general licences to a wider range of invasive non-native bird species to allow the problems these species cause to be tackled and to align use of derogations with the aims of the Invasive Non-native Species Framework Strategy for Great Britain.

Case studies

The following examples illustrate the different approaches we have taken to the challenges posed by three similar non-native mammals, each at a very different stage of establishment or potential invasion. We have chosen to focus on mammals because the regulatory approach to managing non-native mammals is more developed than it is currently for birds. The fully protected status of all birds and, arguably, the political influence exerted by bird enthusiasts have led to a more complex and protracted process when deciding how best to deal with threats posed by non-native birds. Where appropriate, we have cited bird examples.

(i) An established and widespread species

Grey Squirrels *Sciurus carolinensis* were introduced into the UK from America in the late 19th and early 20th century and their population in England is now estimated at perhaps around 2 million (Battersby 2005). The Grey Squirrel is an invasive species that has displaced the native Red Squirrel *Sciurus vulgaris* throughout much of its British range, probably through competition and disease transmission (Rushton *et al.* 2000, Sainsbury *et al.* 2000, Gurnell *et al.* 2004) and ultimately could threaten Red Squirrels throughout Eurasia (Bertolino 2008). They also damage trees and may affect a range of native woodland species through predation and/or competition (Hewson *et al.* 2004, Mayle *et al.* 2004).

Against this background, why issue any licences to release them at all? Indeed, Natural England has faced criticism for doing so. Most of the licences issued are for release of rehabilitated animals by animal ‘rescue centres’. We have taken the view that by issuing limited licences, with appropriate conditions, responsible animal rescue centres will be brought ‘on side’; to adopt a dogmatic position and refuse any licences risks the responsible organizations withdrawing from this activity and Grey Squirrels being dealt with only by groups or individuals that are willing to release them regardless of the legislation. It is wholly unrealistic to believe that the risk posed by illegal releases could be effectively countered through policing.

Licences are only issued to allow the release of animals originally taken from the wild at the location where the animal was found, or within 1 km of it, following the disease risk assessment protocol used for all wildlife licensing in England (see Hartley & Gill 2010). No releases are permitted for any of the counties or areas where Red Squirrels occur or are believed to occur. From 1 April 2006 to the end of October 2008, 20 licences were issued for the release of Grey Squirrels in England; 17 for rehabilitation and welfare purposes and three for research. The 15 licence returns received to the end of October 2008 report 37 squirrels released for research purposes and 29 for rehabilitation/welfare, equivalent to about 26 per annum. Although the numbers are small it is sometimes suggested that issuing licences, in itself, gives ‘the wrong message’, but in the context of a squirrel population in England producing, perhaps, 4.5 million young each year (estimate based on 1 million breeding females and productivity data given in Gurnell 1991), the releases are clearly negligible and we can be completely confident that they will not have any discernible impact on the status of Red Squirrels. On the other hand, the issue of these licences allows us to retain some level of control over releases thereby minimizing the risk of harm and, arguably, making a positive contribution to the protection of Red Squirrels.

Although it is widely accepted (at least in conservation, forestry and agricultural sectors) that the Grey Squirrel is an undesirable invasive, the species is so well established that talk of eradication is wholly unrealistic (Mayle *et al.* 2004). Our approach recognizes the need for a strategy that is sustainable in the long term and which focuses on minimizing/mitigating the potential harm that the species causes.

The Greater Canada Goose is an example of a problem non-native bird species whose management follows a similar approach. This species is now so common and widespread (Rehfishch *et al.* 2010) that eradication is an unrealistic goal and a sustainable long-term management approach to problems needs to be adopted. Licences

are issued to permit a small number of rehabilitated birds to be released (similarly to the Grey Squirrel) and, because the species is protected, to facilitate management, Natural England has reduced regulatory hurdles to lethal control by listing the species on general licences permitting its control for the purposes of conserving flora and fauna, preventing serious damage and disease, and preserving public health and public or air safety.

(ii) An established, but localized species

The Edible Dormouse *Glis glis*, which is native to mainland Europe and the Caucasus, was introduced to Britain at Tring Park, Hertfordshire, in 1902 (Hoodless & Morris 1993, Morris 2008). It has become established in woodland throughout the Chilterns but is mainly confined to within 35 km of the original release site. The species causes damage to trees, similar to that caused by the Grey Squirrel, and commonly enters houses causing damage and nuisance through fouling, noise and gnawing – more than 50 have been reported in a single roof space (Morris 2008).

The Edible Dormouse is in an unusual legal position in that it is listed on Schedule 9 of the 1981 Act, prohibiting its release, but, as a member of the Gliridae, is also covered in Schedule 6, restricting the methods by which it may be taken or killed, including prohibition of the use of traps except under licence. Animals, once trapped (under licence), cannot legally be released back into the wild, unless this is also licensed. However, many householders, reluctant to kill trapped animals, undoubtedly released them, illegally, back into the wild (D. Haskell, Natural England pers. comm.). Some outlying records, beyond the main range, are suspected to be a result of such releases, which therefore contribute to the expansion of their range.

Despite this, the species is still relatively localized and it is perfectly feasible to aim for it to remain so, by preventing its spread into new areas. Should eradication be considered appropriate, this is also probably a realistic option. We therefore exercise a presumption against issuing any release licences, including for rehabilitation, and have issued a general licence to allow the use of traps for their control for the purposes of preserving public health and safety and for preventing serious damage to crops, fruit, foodstuffs for livestock and growing timber. We also advised on the need for an amendment to the Spring Traps Approval Order 1995, now implemented, to allow the use of specified kill traps for this species to encourage lethal control, thereby reducing the problem of illegal releases of live-captured animals.

Through these controls we hope to help prevent further expansion of the species' range and to maintain the position where eradication could, potentially, be undertaken if desired.

Invasive non-native bird species that are established and are expanding in geographical range, but as yet still have relatively localized distributions, include the Rose-ringed Parakeet *Psittacula krameri*, the Monk Parakeet *Myiopsitta monachus* (Tayleur 2010) and the Egyptian Goose *Alopochen aegyptiacus* (Rehfishch *et al.* 2010). All three species have been added to relevant general licences permitting lethal control to manage the problems they can cause.

(iii) Escape of a potential colonizer

The Siberian Chipmunk *Tamias sibiricus* is native to the Siberian taiga zone from the Russian far east, Sakhalin and Hokkaido, west to the White Sea and south to the Altai Mountains and into western China (Long 2003). It has been introduced in Western Europe and feral populations have established in Belgium, Germany, the Netherlands, Switzerland, Italy, France and Austria (Amori 1999, Long 2003). Some of these populations have grown to number several thousands (Amori 1999, Samuel 2008; <http://www.squirrelweb.co.uk/category/alien-species/>). In the Zonienwold in Belgium it has been suggested that they have a negative impact on ground-nesting birds (<http://www.squirrelweb.co.uk/category/alien-species/>) and there is evidence from their native range that they can significantly affect breeding success of the Dusky Warbler *Phylloscopus fuscatus* (Forstmeier &

Weiss 2002, 2004). Other *Tamias* spp. are also implicated as nest predators; for example, chipmunks in California predate Mangrove Warbler *Dendroica petechia* nests (Cain *et al.* 2006) and increases in Eastern Chipmunks *Tamias striatus* in Pennsylvania have resulted in increased predation on bird nests (Yahner 2003). Also, *Tamias striatus* may consume the bulbs of rare perennial wildflowers (Fletcher *et al.* 2001).

The Siberian Chipmunk is commonly kept as a pet in the UK and it is likely that escapes are not uncommon. We recorded five reports of escapes from captivity in England in the 3-year period 2004–06 (own data). These occurred in Yorkshire (May 2004), Berkshire (May 2005 & January 2006, possibly related), Cheshire (June 2006) and Wiltshire (August 2006). One escape, a result of vandalism, concerned a significant number of animals (Berkshire, May 2005, possibly up to 70 animals), sufficient to found a feral population. This was initially reported to us in September 2005. In this case the person(s) responsible for the release was unknown and enforcement action was not our priority. Rather, prompt action was taken to give guidance on trapping and to monitor its success and for continued presence of the animals. A number of animals were caught, the last two in spring 2006, by which time it was considered that there were few or no animals remaining in the wild. Further limited trapping was continued, but no more animals were trapped or sighted. In this case, monitoring and advisory input alone helped to resolve this situation.

This type of rapid, practical, response proved effective in this case and we should be prepared to apply the same rigour to other future threats, including those posed by species such as the Sacred Ibis and the House Crow.

(iv) What about Mink and Muskrats?

The Destructive Imported Animals Act 1932 was originally introduced to enable actions to be taken to control and eradicate feral Muskrats *Ondatra zibethicus* which had established from fur farm escapes in the 1920s. The Muskrats were eradicated by 1939 (Gosling & Baker 1989) but legislators had the foresight to make provision in the Act for similar measures to be taken against other non-indigenous mammals. The Act can prohibit the importation and keeping of specified species and can require occupiers to notify the authorities of the species' presence on their land. Orders made under this Act now restrict the keeping of American Mink *Mustela vison* and Grey Squirrels, except under licence, prohibit the keeping of Coypu *Myocastor coypus* in Great Britain and prohibit the keeping of Mink on most offshore islands and in Caithness and Sutherland Districts, where predation of the nests of seabirds has been a problem (Craik 1997).

The Destructive Imported Animals Act allows more stringent measures than are possible under the Wildlife & Countryside Act, such as prohibition of importation, but only in relation to non-indigenous mammals, as defined in the Act, and only when these are specified in an Order made under the Act. More widely, the limited powers available to restrict imports of potentially invasive non-natives leaves us vulnerable to escapes or releases of species that are legally brought into the country but are not subject to specific controls on their keeping.

Conclusions

There is a range of regulatory provisions in place aimed at controlling the establishment or spread of invasive non-native species, with the main one of these set out in section 14 of the Wildlife & Countryside Act. The provisions, as they exist, do allow some flexibility of approach to deal with different species in different situations. However, there are some weak points and some anomalies.

There is a need to be able to act more precipitously to deal with novel threats. Although the 'rapid response' concept promoted by the GB Non-native Species Programme Board (<https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=99>) aims to address the problem of dealing with a threat on the ground, the regulatory powers need to be able to keep pace with events.

Crucially, a ‘fast-track’ route for adding species to Schedule 9 would overcome some of the current regulatory uncertainties.

The ability to be more precautionary in regulating non-natives, akin to the position in Norway (Størkensen *et al.* 2010), where the onus is placed on importers to prove a species is harmless before it may be imported rather than the current situation in this country where only known harmful species are proscribed, would be a significant step forward. A ‘positive list’ rather than a ‘negative list’ approach could, and perhaps should, be favoured.

Furthermore, the anomaly that non-native wild birds (but not non-natives of other taxa) are given full protection under English law should be reviewed. United Kingdom domestic legislation goes further than is required by the Birds Directive which, as stated in article 1, ‘relates to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States’. The broadening of the scope of UK legislation to include any non-native species resident in the EU, particularly those that threaten species native to Europe, is counter-intuitive and, arguably, contrary to article 11 of the Directive and the aims of the Bern Convention. While some non-natives are widely regarded as a benign addition to the UK fauna (e.g. Little Owl *Athene noctua*) this apparent contradiction should be reviewed in light of the greater priority given today than in 1981 to the threat posed by non-native species.

Nevertheless, given the history of non-native incursions to this country, and the varying levels of risk or harm caused by different species, we need to retain a degree of flexibility. A one-size-fits-all approach to regulation is unlikely to meet the needs of the real world.

References

- Amori, G. 1999. *Tamias sibiricus*. In Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Krystufek, B., Reijnders, P.J.H., Spitzenberger, F., Stubbe, M., Thissen, J.B.M., Vohralik, V. & Zima, J. (eds) *The Atlas of European Mammals*: 194–195. London: Poyser/Academic Press.
- Battersby, J. (ed.) 2005. *UK Mammals: Species Status and Population Trends*. Peterborough: JNCC/Tracking Mammals Partnership.
- Bertolino, S. 2008. Introduction of the American grey squirrel in Europe: a case study in biological invasion. *Current Science* **95**: 903–906.
- Cain, J.W., Smallwood, K.S., Morrison, M.L. & Loffland, H.L. 2006. Influence of mammal activity on nesting success of Passerines. *J. Wildlife Manage.* **70**: 522–531.
- Craik, J.C.A. 1997. Long-term effects of North American Mink *Mustela vison* on seabirds in western Scotland. *Bird Study* **44**: 303–309.
- Department for Environment, Food and Rural Affairs (Defra). 2008. *Supplementary Note 1 to the Policy Statement – Licensing Introduction of Animals and Plants into the Wild (Section 14 and 16(4)(C) of the Wildlife & Countryside Act 1981)*. London: Department for Environment, Food and Rural Affairs.
<http://www.defra.gov.uk/wildlife-pets/wildlife/management/documents/policy-supnote-nonnative.pdf>
- Department for Environment, Food and Rural Affairs (Defra). 2009. *Guidance on section 14 of the Wildlife and Countryside Act, 1981. Published: 21/12/2009. Amended: 21/05/2010*. London: Department for Environment, Food and Rural Affairs.
<http://www.defra.gov.uk/wildlife-pets/wildlife/management/non-native/documents/section-14-guidance.pdf>
- Dudley S.P. 2005. Changes to Category C of the British List. *Ibis* **147**: 803–820.
<http://www3.interscience.wiley.com/cgi-bin/fulltext/118644709/PDFSTART>
- Fletcher, J.D., Shipley, L.A., McShea, W.J. & Shumway, D.L. 2001. Wildlife herbivory and rare plants: the effects of White-tailed Deer, rodents, and insects on growth and survival of Turk’s Cap Lily. *Biol. Conserv.* **101**: 229–238.

- Forstmeier, W. & Weiss, I. 2002. Effects of nest predation in the Siberian Chipmunk on success of the Dusky Warbler breeding. *Zool. Zb.* **81**: 1367–1370.
- Forstmeier, W. & Weiss, I. 2004. Adaptive plasticity in nest-site selection in response to changing predation risk. *Oikos* **104**: 487–499.
- Gosling, L.M. & Baker, S.J. 1989. The eradication of Muskrats and Coypus from Britain. *Biol. J. Linn. Soc.* **38**: 39–51.
- Gurnell, J. 1991. Grey Squirrel. In Corbet, G.B. & Harris, S. (eds) *The Handbook of British Mammals*: 186–191. Oxford: Blackwell.
- Gurnell, J., Waters, L.A., Lurz, P.W.W. & Tosi, G. 2004. Alien species and interspecific competition: effects of introduced eastern grey squirrels on red squirrel population dynamics. *J. Anim. Ecol.* **73**: 26–35.
- Harris, S., Morris, P.A. & Yalden, D.W. 2008. The mammal fauna of the British Isles in perspective. In Harris, S. & Yalden, D.W. (eds) *Mammals of the British Isles: Handbook*, 4th edn: 6–16. Southampton: The Mammal Society.
- Hartley, M. & Gill, E. 2010. Assessment and mitigation process for disease risks associated with wildlife management and conservation interventions. *Vet. Rec.* **166**: 487–490.
- Henderson, I.S. 2009. Progress of the UK Ruddy Duck eradication programme. *Br. Birds* **102**: 680–690.
- Henderson, I.S. 2010. North American Ruddy Ducks *Oxyura jamaicensis* in the United Kingdom – population development and control. *BOU Proceedings – The Impacts of Non-native Species*.
<http://www.bou.org.uk/bouproc-net/non-natives/henderson20100531>
- Hewson, C., Fuller, R., Mayle, B. & Smith, K. 2004. Possible impacts of Grey Squirrels on birds and other wildlife. *Br. Wildlife* **15**: 183–191.
- Hill, M., Baker, R., Broad, G., Chandler, P.J., Copp, G.H., Ellis, J., Jones, D., Hoyland, C., Laing, I., Longshaw, M., Moore, N., Parrott, D., Pearman, D., Preston, C., Smith, R.M. & Waters, R. 2005. *Audit of non-native species in England*. English Nature Research Report 662. Peterborough: English Nature.
- Hoodless, A. & Morris, P.A. 1993. An estimate of population density of the Fat Dormouse. *J. Zool.* **230**: 337–340.
- Long, J.L. 2003. Siberian Chipmunk. In *Introduced Mammals of the World; Their history, distribution and influence*: 133–134. Oxford: CABI Publishing.
- Mayle, B., Pepper, H. & Ferryman, M. 2004. *Controlling Grey Squirrel Damage to Woodlands*. Forestry Commission Practice Note. Edinburgh: Forestry Commission.
- Morris, P. 2008. Edible Dormouse. In Harris, S. & Yalden, D.W. (eds) *Mammals of the British Isles: Handbook*, 4th edn: 82–85. Southampton: The Mammal Society.
- Natural England. 2009. *Consultation: General Licences under Wildlife Legislation in England*.
http://www.naturalengland.org.uk/Images/genlicconsultation_tcm6-7010.pdf
- Rehfishch, M.M., Allan, J.R. & Austin, G.E. 2010. The effect on the environment of Great Britain's naturalized Greater Canada *Branta canadensis* and Egyptian Geese *Alopochen aegyptiacus*. *BOU Proceedings – The Impacts of Non-native Species*.
<http://www.bou.org.uk/bouproc-net/non-natives/rehfishch-et-al.pdf>
- Rushton, S.P., Lurz, P.W.W., Gurnell, J. & Fuller, R. 2000. Modelling the spatial dynamics of a parapoxvirus disease in red and grey squirrels: a possible cause of the decline in the red squirrel in the UK? *J. Appl. Ecol.* **37**: 997–1012.
- Sainsbury, A.W., Nettleton, P., Giltray, J. & Gurnell, J. 2000. Grey squirrels have high seroprevalence to a parapoxvirus associated with deaths in red squirrels. *Anim. Conserv.* **3**: 229–233.
- Samuel, H. 2008. Paris battles invasion of the Siberian chipmunk. *The Telegraph*
<http://www.telegraph.co.uk/news/worldnews/europe/france/3229344/Paris-battles-invasion-of-Siberian-chipmunk.html>
- Snell, S., Tetteh, J. & Evans, I.H. 2005. Phylogeography of the pool frog (*Rana lessonae* Camerano) in Europe: evidence for native status in Great Britain and for an unusual postglacial colonization route. *Biol. J. Linn. Soc.* **85**: 41–51.
- Størkensen, Ø., Thompson, D.B.A. & Baxter, J.M. 2010. Challenges and innovations in species management – a Nordic perspective. In Baxter, J.J. & Galbraith, C.A. (eds) *Species Management; Challenges and Solutions for the 21st Century*: 365–378. Edinburgh: TSO Scotland.

Wilson & Heydon. 2010. *BOU Proceedings – The Impacts of Non-native Species*.
<http://www.bou.org.uk/bouproc-net/non-natives/wilson-heydon.pdf>

Tayleur, J.R. 2010. A comparison of the establishment, expansion and potential impacts of two introduced parakeets in the United Kingdom. *BOU Proceedings – The Impacts of Non-native Species*.

<http://www.bou.org.uk/bouproc-net/non-natives/tayleur.pdf>

Thomas, H.M. 2010. Invasive non-native species – the government view. *BOU Proceedings – The Impacts of Non-native Species*.

<http://www.bou.org.uk/bouproc-net/non-natives/thomas20100531.pdf>

Yahner, R.H. 2003. Population trends in eastern chipmunks: implications to avian nesting success. *J. Pennsylvania Acad. Sci.* **76**: 62–65.