

THE STATUS OF SCARCE NON-NATIVE
BIRDS AND MAMMALS IN ENGLAND

Central Science Laboratory

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1. Executive summary

- Invasive non-native species constitute one of the leading threats to natural ecosystems and biodiversity, and also impose an economic cost on a range of human enterprises, including agriculture, forestry and fisheries, as well as posing a threat to human health.
- The Convention on Biological Diversity (CBD) advocates a precautionary approach in the management of non-native species. If a species identified as posing an invasive threat enters an area, early detection and eradication is the preferred and most cost-effective management option.
- The Invasive Non-native Species Framework Strategy for Great Britain emphasises ‘...preventative measures and more rapid, targeted action now to reduce or avert far larger future pressures and costs from invasive non-native species.’
- This study assessed the status of a number of scarce non-native mammals (10 species) and birds (5 species) in England. These species are potentially at the stage of colonisation or establishment at which management may represent a feasible and cost-effective option.
- Reported sightings were collated from numerous sources, including press articles, web sites and reports. Sightings were evaluated for their veracity through cross-referencing information from different sources, consultation with specialists and field evaluation. The current abundance and distribution of each species was assessed, along with their potential impact.
- Of the avian species, monk parakeet, Alexandrine parakeet, blue-crowned parakeet and eagle owl are breeding (or attempting to breed) in the wild. The presence of sacred ibis is restricted to occasional individuals that are the result of escapes from captivity within Britain and potentially migrants from feral colonies on the French Atlantic seaboard.
- The mammal species fell into three categories, those: (i) with established breeding populations – edible dormouse, (ii) that occur sporadically as a result of escapes from captivity - raccoon, raccoon dog, skunk, coatimundi, chipmunk and sugar glider, (iii) with evidence for the past existence of established groups and breeding in the wild - prairie dog, short-clawed otter and red-necked wallaby. For the latter category, confirmation of contemporary colonies and breeding is lacking.
- Four species have exhibited some degree of negative economic, environmental or social impact, in England. The edible dormouse causes the most significant economic impact with damage to buildings and woodlands; monk parakeets are a source of social and health nuisance due to noise and faecal contamination in suburban areas, their large nests may also pose a nuisance and there is historical evidence of damage to orchards; coatimundi have predated domestic fowl in isolated incidents; eagle owls have apparently killed two hen harriers and a buzzard and harassed a number of people and domestic animals.

- The edible dormouse is the longest established and most numerous (minimum 10,000 individuals) of the selected species. It is largely restricted to the Chilterns, but sightings have been reported from numerous counties, up to 100km distant. The regional distribution of the edible dormouse outside of the Chilterns is unknown. Only three applications to control edible dormice have been received from outside the Chilterns - Bedfordshire and Wiltshire.
- The monk parakeet is the next most established species with a breeding population having persisted in Borehamwood, London, for the past 15 years. Field evaluation recorded two main nesting sites; 90 birds were estimated in February 2008.
- In its native South America, the monk parakeet is perceived as a significant agricultural pest. In countries where it has been introduced, however, there have been few reports of agricultural damage; although their numbers and/or distribution may be limited. The main problem in their introduced range (USA) is their propensity to build nests on electrical utility structures and the economic damage from consequent short-circuits and power failures.
- In England, monk parakeets are presently restricted to urban areas but have the potential to impose future economic damage if they expand their range into fruit growing regions.
- In the case of the eagle owl, controversy surrounds its presence in Britain. There is disagreement amongst interested parties over whether or not some birds may have colonised naturally from mainland Europe (rather than all birds being escapes/releases). Also, there is dispute over whether or not the species was historically part of the British avifauna; hence whether or not the eagle owl should be categorised as an introduced non-native species.
- There have been recent isolated incidents of feral coatimundi predated domestic fowl. The presence of coatimundi in the wild, however, is probably due to a series of individual escapes, with no evidence for establishment or breeding.
- Development and maintenance of a non-native vertebrate species sightings database is recommended. This will provide information on any developing patterns in the frequency and distribution of sightings and would facilitate the targeting of field investigations for evaluation of the species' status. The non-native database currently maintained by Natural England's Wildlife Management and Licensing Service (NEWMLS) is limited to records received rather than proactive searching of potential sources of sightings. Such a database would also supplement sightings data collected under the developing web portal proposed under the GB IAS Strategy.
- There is an absence of centrally held databases in a number of areas that are potential sources for escaped non-native species: (i) inventories of animals held by zoos and wildlife parks, (ii) inventories of animal sanctuaries and animals held, (iii) animals held under license under the Dangerous Wild Animals Act, and (iv) the extent and nature of the non-native pet trade. The development and maintenance of such databases would facilitate assessments of the spatial distribution of the risk of escapes and establishment of non-native species.

2. Introduction

Invasive alien (or non-native) species (IAS) are accepted as one of the greatest threats to global biodiversity, along with overexploitation and habitat loss (Atkinson, 1996; Diamond, 1984; Vitousek *et al.*, 1997). Along with their impacts on biodiversity, IAS also have major economic, agricultural and health impacts. Few estimates exist of the cost of non-native species invasion but indications are that these can be very substantial. The economic impacts to crops, pastures, forests and the environment associated with introduced pests has been estimated to amount to \$137 billion per annum in the USA (Pimentel *et al.* 2000a) and \$12 billion per annum in the UK (Pimentel *et al.* 2000b). In Australia, for non-indigenous vertebrates alone, the estimated economic and environmental costs attributable to the major pests amount to \$493 million per annum (Bomford & Hart 2002); in New Zealand \$270 million per annum (Clout 2002); in USA \$40 billion per annum (Pimentel *et al.* 2002b); in Britain £239 million per annum (White & Harris 2002).

Both the Convention on Biological Diversity (CBD) and the Global Invasive Species Programme (GISP) (Wittenberg & Cock 2001) advocate a precautionary approach towards managing non-native species. This approach is based on the premise that, in regard to species that pose an invasive threat (i.e. spreading and causing detrimental impacts) even if there is a lack of scientific certainty about the various implications of an invasion this should not be used as a reason for postponing or failing to take appropriate preventative, eradication, containment and control measures. The guiding principle in the management of invasive non-native species follows a hierarchical process (e.g. Wittenberg & Cock 2001):

PREVENTION

This includes an assessment of the risk posed by potential invaders in the region, and identifying and managing potential invasion pathways. This is implemented into action through education and interception measures at both the points of export and entry for invasive species. Prevention is the most desirable and cost-effective strategy that eliminates the problem at its source.

ERADICATION

Eradication is the removal of the entire population of a non-native species in the managed area, and is the preferred measure if prevention has failed. However, it is accepted that eradication may not be achievable, acceptable or affordable in many cases. Though eradication may be a costly option, it has a finite timescale and if achieved, is a permanent solution. Eradication as a rapid response to an early detection of a non-native species is often the key to a successful and cost-effective solution. A careful analysis of the costs and likelihood of success must be made, however, and adequate resources mobilised, before eradication is attempted.

CONTAINMENT

The aim of containment is to restrict the spread of a non-native species and to contain the population in a defined, restricted geographical range. The population is suppressed at the boundaries of the containment area and individuals dispersing beyond this are removed. The measure depends on the ability to rapidly detect the individuals, occurring at low density, at both the margins of the containment area, and in completely new areas.

CONTROL AND MITIGATION

Where eradication and containment are not possible (e.g. prohibitive costs) control or mitigation of perceived impacts of invasive species may be the only available course of action. Control aims for the long-term reduction in density and abundance of the non-native species to below a pre-set acceptable threshold. Though open ended with an infinite timescale, this is sometimes more acceptable than an eradication which has the potential to fail. It needs to be accompanied with a monitoring programme to ensure that detrimental impacts do not exceed a level that can be manageably controlled, and that a larger, more harmful invasion, possibly triggered by changes in the environment (e.g. climate change) are detected and responded to. Mitigation, in contrast, does not directly manage the invasive species but rather focuses on minimising impacts.

A number of mammal and bird species introduced into the UK have caused problems (some high profile), including the ruddy duck *Oxyura jamaicensis*, Canada goose *Branta Canadensis*, grey squirrel *Sciurus carolinensis*, coypu *Myocastor coypus*, muskrat *Ondatra zibethica* and American mink *Mustela vison*. There have been relatively few successful attempts to control or eradicate non-native species once they are established (Manchester & Bullock 2000). Historically, control programmes are usually not initiated until a species becomes a problem, by which time the costs of any population control measures are far more extensive. For example, an attempt in the 1960s to eradicate the American mink in the UK was abandoned in 1970 after only 5 years, probably because mink were too widely distributed by the time the scheme was introduced and insufficient funds were allocated to it (Dunstone 1993).

Where eradication has been successful the species in question has been confined to reasonably small areas of Britain, with no immigration from surrounding regions, e.g. coypu and muskrat (Manchester & Bullock 2000). Even in a relatively small geographic area, however, the costs of eradicating a well-established species can be high. Following escapes of muskrats from fur farms in the late 1920s, a large population became established in Shropshire, with smaller numbers in Surrey, East Sussex and Stirling. An extermination campaign began in 1932 and was successfully completed by 1939. The cost of this eradication, at 1990 prices, has been estimated at £1.5m (Baker 1990). Coypus, originally introduced for fur farming in 1929, established a population in Norfolk around the mid 1930s, and grew progressively to a peak of between 50,000 and 100,000 in the mid-1950s. Although organised trapping began in 1962 and removed 40,000 coypus by 1965, a concerted eradication scheme only began in 1981. The coypu population was effectively reduced to zero by 1987. The estimated cost of the scheme was £2.5m at 1987 prices (Gosling & Baker 1987, 1989). More recently, the first phase of eradication of mink from the Uists in the Western Isles, Scotland, took four years at a cost of £1.6 million. Currently, a 5-year (2005-2010) eradication scheme to remove ruddy duck from the UK is underway, at a cost of £3.3 million (excluding preliminary research and trials). These costs contrast sharply with an estimated cost of £80,000 for an early intervention to successfully eradicate a small population of Himalayan porcupine *Hystrix brachyura* from Devon, during the 1970s. A small population became established after the escape of a pair of animals from a wildlife park in 1969; the population (around 12 individuals) was successfully eradicated by 1979.

These examples underline the risk inherent in a delayed response to a new invasion and underline the cost-effectiveness of implementing CBD/GISP guidelines and initiating management measures as soon as possible, when invasive species are low in numbers and restricted in their distribution. The Invasive Non-native Species Framework Strategy for Great Britain advocates a more balanced focus between reactive management and a more preventative approach, emphasising a strategy of ‘...preventative measures and more rapid, targeted action now to reduce or avert far larger future pressures and costs from invasive non-native species’ (Anon 2007).

3. Aims

The overall aim of the study is to assess the population status of a selected list of established, scarce non-native mammal and bird species present in England. Each species is either known to be, or is potentially, existing in the wild. Presently, however, these species are at population levels that are sufficiently low to make management a feasible and economically viable option. The species under consideration are:

Raccoon	<i>Procyon lotor</i>
Raccoon dog	<i>Nyctereutes procyonoides</i>
Striped skunk	<i>Mephitis mephitis</i>
Coatimundi	<i>Nasua nasua</i>
Siberian chipmunk	<i>Tamias sibiricus</i>
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>
Short clawed otter	<i>Aonyx cinerea</i>
Edible dormouse	<i>Glis glis</i>
Red-necked wallaby	<i>Macropus rufogriseus</i>
Sugar Glider	<i>Petaurus breviceps</i>
Monk parakeet	<i>Myiopsitta monachus</i>
Alexandrine parakeet	<i>Psittacula eupatria</i>
Blue-crowned parakeet	<i>Aratinga acuticaudata</i>
Eagle owl	<i>Bubo bubo</i>
Sacred ibis	<i>Threskiornis aethiopicus</i>

Specific objectives of the study are to:

1. Collate reports of sightings of each of the listed species.
2. Evaluate the veracity of sightings by cross-referencing reports from different sources, consultation with specialists and fieldwork.
3. Qualitatively assess the relative abundance and distribution of each species, and their breeding status.
4. Identify any species that are established, or becoming established, and are also imposing detrimental impacts on the environment.

The study involved close cooperation between Central Science Laboratory (CSL) and Natural England’s Wildlife Management and Licensing Service (NEWMLS) (previously Defra Rural Development Service – RDS).

4. Methods

Information on the ecology of the selected non-native species and their introductions outside their native range was summarized from the available literature. Information on sightings of these species living-free in England was collated from a number of sources, including: research journal articles, newspaper reports, web articles, individual experts and wildlife organisations.

Species accounts are presented below and provide details on native distribution, habits, diet, damage caused, countries where introduced (mainly from Long 1981, 2003; Baker 1990; Baker & Hills 2008) and a summary of sightings within Great Britain (GB) (concentrating on England).

Supplementary to the species accounts, tabulated lists of reported sightings, recording the date, location, summary details of each sighting event and reference source is presented in Annex I (Tables A1-A15). A map was also produced for each species indicating the location of sightings in England and these are presented in Annex II (Figures A1-A15).

5. Species accounts

5.1 [RACCOON *Procyon Lotor*](#)

American raccoon, common raccoon

Distribution

North, Central and South America. Prefers woodland near water.

Habits

Nocturnal; partial hibernation or dormant for period in cold regions; terrestrial and arboreal; dens in natural cavities or abandoned burrows; solitary or family groups; more or less sedentary.

Diet

Omnivorous; a wide range of small vertebrates and invertebrates - terrestrial, freshwater and marine, including birds and eggs, fish, amphibians, grain, corn, acorns, nuts, berries, fruit, scrap food.

Damage

Predation on waterfowl, muskrats, quail and many other forms of wildlife (USA); consumption of corn and peanuts (Grand Bahama) and root vegetables (Japan); predate game birds (Russia). In the USA it is a major wildlife vector of rabies. The raccoon is included as one of the fifteen worst invasive non-native terrestrial vertebrate species listed in the Delivering Non-native Invasive Species Inventories for Europe (DAISIE) IAS database.

Introductions

Imported into numerous countries for fur farms, zoos and as non-native pets. Escape from captivity has resulted in well-established populations in Germany, France and the Netherlands, Belarus, Caucasian region and Turkestan (Long 2003). Other

countries with well-established populations are Belgium, Austria, Switzerland and the Czech Republic (Baker & Hills 2008).

GB sightings

Long (2003) reports at least 20 records of free-living raccoons in Britain, including Powys, Strathclyde and Sussex. There have been 13 reports of raccoons free in the UK between 2000-2007; all but one involving an individual animal. A number of these sightings have been in Leicestershire. Further single occurrences have occurred in West Sussex, Kent, Devon and Northamptonshire.

5.2 RACCOON DOG *Nyctereutes procyonoides*

Raccoon-like dog

Distribution

Eastern Asia. Prefers wooded valleys and slopes.

Habits

Mainly nocturnal; lives in burrows or natural cavities; dormant in cold weather in northern regions; solitary, pairs or family groups.

Diet

Omnivorous; a wide range of small mammals, reptiles, birds and eggs, fish, amphibians, invertebrates, acorns, nuts, fruits, berries, grain and roots, scrap food.

Damage

Predation on game birds (Russia); agricultural damage to vineyards and predation on waterfowl (Ukraine); displace badgers from burrows (Latvia and Poland); potential carrier of rabies. The raccoon dog is included as one of the fifteen worst invasive non-native terrestrial vertebrate species listed in the DAISIE IAS databases.

Introductions

Introduced to Russia as a fur animal and subsequently spread westwards into central Europe to Romania, Poland, Hungary, Czech Republic, Slovakia, Switzerland, Finland, Austria, Netherlands, Germany, Sweden and Norway.

GB sightings

One confirmed sighting of a raccoon dog in Berkshire in July 2005 (NEWMLS). In the 1990s, there was a report of a raccoon dog killed near Loch Lomond (CSL).

5.3 STRIPED SKUNK *Mephitis mephitis*

Common skunk

Distribution

North America. Broad habitat preferences, including forest, woods, plains, desert, agricultural land, river valleys, suburban areas.

Habits

Mainly nocturnal and crepuscular; lives in natural rock crevices or in underground burrows usurped from other species; hibernates in northern regions during winter; solitary, pairs or family groups; disperse in summer.

Diet

Omnivorous; a wide range of small mammals, reptiles, amphibians, fish, molluscs, insects, berries, buds, fruit, corn, nuts, leaves, grain, grass, carrion.

Damage

It consumes rodents, invertebrates, fruit, grains etc.. In the USA it is a major wildlife vector of rabies. On Vancouver Island, Canada, found to eat quail eggs and voles.

Introductions

Skunks were introduced into the Russian Federation and adjacent independent Republics, Ukraine and the Caucasus during the 1930s, but with little success. Introduced successfully to Prince Edward Island and Vancouver Island, Canada.

GB sightings

During 2001-2003, the RSPCA responded to a total of 25 incidents involving skunks. These incidents involved individuals that had escaped and others that had been abandoned. There were no records of skunk persisting in the wild.

The Guardian newspaper (12th August 2003) reported that the head of veterinary services at Bristol Zoo believed that there may be no more than 100-200 striped skunks kept as pets in Britain. Also, that many owners are believed to have consulted US-based websites about skunk care, not knowing that de-scenting, routinely performed by breeders, is banned in Britain; the Royal College of Veterinary Science regarding the practice as unethical.

5.4 COATIMUNDI *Nasua nasua*

Brown-nosed coati, northern coati

Distribution

South America and southern United States. Prefers forest and wooded areas.

Habits

Mainly diurnal; terrestrial and somewhat arboreal; roost in trees; groups, males solitary outside breeding season.

Diet

Mainly frugivorous; fruits, berries, insects and other invertebrates, palm nuts, figs, occasionally poultry and other meat.

Damage

Reported depredations in orchards and chicken houses (South America); (unconfirmed) depredation of island avifauna (Juan Fernandez island).

Introductions

Introduced to the island of Juan Fernandez (Chile) for rat control and became established. Introduced into Oklahoma and Indiana in US.

GB sightings

In 2003-04, there were a number of sightings of coatimundi in the southern Lakeland, Cumbria. All sightings involved single animals, but with sightings sufficiently far enough apart to indicate that more than one animal had been in the region. Recent investigations by NEWMLS (October 2007) revealed that there have been many sightings of coatimundi that have not been subject to press interest (Police Wildlife Crime Officer). The majority have been in the south Lakeland peninsula, within relative 'close' proximity to the South Lakes Wild Animal Park. The Park appears to be implicated in many of the sightings; although park officials have stated 'no coatis are missing from the park'. Sightings further north are reported from Eden, Grizedale, Kendal, Kentmere, Langdale and Melmerby; the latter near Penrith.

5.5 SIBERIAN CHIPMUNK *Tamias sibiricus*

Asiatic chipmunk, chipmunk, Siberian ground squirrel

The genus *Tamias* comprises more than 20 species of which *T. sibiricus* is most commonly kept as a pet (Meredith, 2002). Escapes from captivity have been reported in the UK.

Distribution

Asia: Siberian range west to the White Sea, south to western China. Forest near steppe, dwarf forest along tundra, deciduous undergrowth, thickets, plantations, areas near crop fields.

Habits

Diurnal; mainly terrestrial; burrows; hibernates in winter.

Diet

Seeds grass, sedges, weeds, seeds, trees, shrubs, pine nuts, grain, flowers, herbs, small fruits, berries, mushrooms, bulbs, amphibians, reptiles, young birds, invertebrates.

Damage

In its native range, *T. sibiricus* is reported to have a significant impact on the production of forest nuts and cereal grain crops (Long 2003), and may also consume the bulbs of rare perennial wildflowers (Fletcher *et al.* 2001). In some areas of Siberia they are considered to be one of the greatest rodent pests. Crops affected include wheat, rye, barley, oats, corn, flax, millet and sunflower; they also damage gardens and orchards. There is evidence of predation of nesting birds and eggs, both in its native range (dusky warblers *Phylloscopus fuscatus*, Forstmeier & Weiss 2002, 2004) and in countries of introduction (Belgium, Verbeyen 2001). The chipmunk is on the DAISIE IAS database as one of the fifteen worst invasive non-native terrestrial vertebrates.

Introductions

Populations of *T. sibiricus* have become established from escapes and deliberate releases in parts of western Europe, including Austria, Belgium, France, Germany, Italy, The Netherlands, Switzerland and Japan (Amori 1999, Long 2003).

GB sightings

During 2004-2006, there have been a number of sightings of chipmunks. Most were associated with three major escape/releases of 5 (Cheshire), 19 (Wiltshire) and 30-70 (Berkshire) individuals. All but four of these animals were reported to have either subsequently died, or to have been recaptured or killed. Other sightings have been reported from Lancashire, N. Yorkshire, W. Yorkshire, and Wiltshire.

5.6 BLACK-TAILED PRAIRIE DOG *Cynomys ludovicianus*

Black-tailed prairie dog

Distribution

North America, from Texas to the Canadian boundary. Prefers grasslands, prairie, river flats.

Habits

Diurnal; stores food; colonial (1 male, 3-4 females and young); builds burrows and mounds, with multiple exits, stores food; sedentary.

Diet

Weeds, forbs, grasses, roots, leaves, stems and insects.

Damage

Consume or uproot various crops, such as wheat, corn, alfalfa, hay, sorghum, beans, potatoes and cantaloupes; girdles newly planted fruit trees. In the USA, due to the damage caused, during the first half of the twentieth century there was intensive and prolonged control resulting in a much reduced range.

Introductions

In US, introduced to Nantucket and Martha's Vineyard islands, Massachusetts.

GB sightings

There have been records of prairie dog colonies in Cambridgeshire, Cornwall (1976) and Isle of Wight. All three colonies involved animals that had escaped from nearby wildlife parks. Since 1999, however, the only record has involved an individual recovered (by the RSPCA) from a household driveway in Glastonbury, Somerset.

5.7 SHORT-CLAWED OTTER *Aonyx cinerea*

Oriental Small Clawed Otter, Malaysian Small Clawed Otter

Distribution

Southeast Asia from northern India to southeastern China, the Malay Peninsula, and parts of Indonesia. Freshwater and brackish habitats such as rivers, creeks, estuaries, coastal waters, mangrove swamps, small streams and marshy areas

Habits

Largely nocturnal; semi-social, as many as 15 can be seen together although it is more common to find groups of 4-8; groups composed of a dominant pair together with offspring from successive litters; large litters of 4 or 5 cubs; can produce 2 litters per year; males and females may pair for life; communicate with different vocal sounds - there is recorded evidence of at least 12 different vocalizations.

Diet

Crustaceans, molluscs, snails, frogs, small fish.

Damage

Short-clawed otters can be mildly destructive through accidentally uprooting rice seedlings.

Introductions

No details on introductions available.

GB sightings

Since first being recorded in the wild in 1981, there were regular but infrequent sightings of short-clawed otters, up to the mid 1990s. The principal locations for sightings were the rivers and canals around Oxford; although others have been in Bath and Kent. On two occasions an adult was observed with cubs.

Following the 1990s, there has been a lack of records in the Thames Valley region. It has been suggested that the reintroduction and recovery of native otters *Lutra lutra* may have resulted in the killing or displacement of local short-clawed otters (Strachan & Jeffries 1996 and Jeffries 2003 cited in Baker & Hills 2008). This was regarded as likely as the recovering otter population was considered to have eliminated the local mink population within two years (Jeffries 2003 cited in Baker & Hills 2008).

5.8 EDIBLE DORMOUSE *Glis glis*

Fat dormouse, squirrel-tailed dormouse

Distribution

Eurasia: northern Spain, south eastern and eastern France, eastwards to Israel, northern Iran and the Caucasus. Forest, deciduous woodland, plantations, scrub, orchards, vineyards, gardens; often inhabits human dwellings.

Habits

Mainly nocturnal or crepuscular; mainly arboreal; hibernates or dormant; shelters in tree hollows or in burrows; builds nest of plant material and moss in tree.

Diet

Beechmast, nuts, acorns, seeds, fruits, berries, buds, leaves, bark, fungi, insects, other small animals, occasionally birds eggs and nestlings.

Damage

In Europe the edible dormouse can be a serious pest of fruit crops. In northern Tuscany, relatively recent increases in numbers have created problems for the

cultivation of pine *Pinus pinea*; between 1969 and 1975 the dormouse affected annual pine production by an estimated 1,550 tonnes equivalent to 110 million lira (Santini 1978). In France, Germany and Russia there are sometimes depredations to fruit orchards. In England, they have caused considerable damage by bark-stripping young conifers and may also cause local damage to fruit crops (apples and plums). The dormouse can cause considerable damage to buildings by chewing through electric cables, roofing felt and ceiling plaster.

Introductions

In 1902 edible dormice from Europe were released, as part of a wildlife collection, at Tring Park, Hertfordshire. Escapes from this collection led to the establishment of a population in the wild.

GB sightings

At present, the main population of edible dormouse has a restricted distribution in the Chiltern area of Buckinghamshire, Berkshire and Herefordshire (Battersby 2005), within 25km of its release site in Tring. The current population is estimated to number at least 10,000 animals (Harris *et al.* 1995). There have been reports, however, of edible dormouse from a number of locations up to 100km (New Forest) from Tring. These outlying sightings represent either separate introductions or translocations of individuals trapped (and released) in domestic buildings in the population's main range in the Chilterns.

5.9 RED-NECKED WALLABY *Macropus rufogriseus*

Red wallaby, scrub wallaby, Bennett's wallaby, brush wallaby

Distribution

Australia, Tasmania, King Island, Flinders Island. Forest edge, woodland and coastal scrub with grassland.

Habits

Nocturnal; solitary; sedentary.

Diet

Grasses, herbs, leaves, clover, roots, weeds; England – heather, bracken, pine and birch scrub, bilberries.

Damage

In New Zealand in the 1940s, red-necked wallabies were recognised as a pest of pastures; although no quantitative evidence is available. Also reported to cause a considerable amount of damage to agricultural crops, and by browsing shrubs and plantations of exotic trees; however, there are few figures to substantiate damage. In Australia, red-necked wallabies become pests of crops and pastures at times.

Introductions

Introduced successfully into Tasmania, New Zealand and England, and unsuccessfully to Germany, Czech Republic, Slovakia, Hungary and the Ukraine.

GB sightings

A number of escapes/releases have failed to establish populations, including Cromer, Norfolk (1850s), Lundy Island (1920s) and East Grinstead (c.1949). However, colonies did become established in a number of areas, notably the Peak District (Derbyshire/Staffordshire), Ashdown Forest (Sussex), Teignmouth (Devon), Inchconnachan on Loch Lomond, Scotland, and Ballaugh Curraghs on the Isle of Man.

The Peak District population are derived from an escape/release of five animals from an enclosure in Staffordshire in 1939-40. The original wallabies bred and colonised the moorland to the north west of Leek, as well as woodland around Hoo Moor about 10 miles north, across the Derbyshire border. The wallabies were reported most often at The Roaches, an area very popular with tourists, but had been seen in woodland in quieter parts of the Peaks. The population increased to an estimated fifty animals in 1962; thereafter declining to between 10-20 during 1970-90 (Yalden 1988). In 1993, the population stood at only an estimated three animals. The population, however, has been proclaimed extinct several times since the 1950s, but has then turned up again after a few years (www.beastwatch.co.uk/Staffordshire.htm#WALLABIES).

The Ashdown Forest colony is presumed to have originated from a captive colony near Horsham, in Sussex. In the early 1940s, there was an apparent fully naturalized and breeding colony in the Ashdown Forest and St. Leonard's Forest district (Lever 1977). Harris *et al.* (1995) report that this population, and the Teignmouth population are now extinct.

The population on Inchconnachan, Loch Lomond, was deliberately established by Lady Arran in the 1960s or 1970s. In 2002, the numbers of wallabies on the island was estimated at around 40 (SNH 2002).

A further colony of around 30 wallabies (2001) is living at Ballaugh Curraghs, on the Isle of Man.

Since 2000, individual sightings have been reported from a number of English counties, most notably Suffolk.

5.10 SUGAR GLIDER *Petaurus breviceps*

Distribution

Australia (northern and eastern) - Indonesia. Dry forest and woodland.

Habits

Nocturnal; arboreal; nests in hollow branch; glides; territorial; nest in groups of up to 20; sedentary.

Diet

Omnivorous; sap, blossom, buds, nectar, insects and larvae, arachnids, small vertebrates.

Damage

Bark stripping of trees.

Introductions

Southern Victoria, Australia; Tasmania; Malaku, Indonesia.

GB sightings

Sightings of sugar gliders have been reported from Wimbledon Common, London. The first sighting was in 2000, with a further four reports since 2003 from different parts of the common. There has also been a reported sighting in Brompton cemetery, Kensington.

5.11 MONK PARAKEET *Myiopsitta monachus*

Quaker parakeet, grey-headed parakeet

The monk parakeet is classified as category E* by the British Ornithologist' Union (BOU). Category E species are those that have been recorded as introductions, human-assisted transportees or escapees from captivity, and whose breeding populations (if any) are thought not to be self-sustaining. Species in Category E that have bred in the wild in Britain are designated as E*. Category E species form no part of the British List (which comprises categories A, B and C). Category E has been introduced to enable local and national recorders to monitor escaped species.

Distribution

South America; central Bolivia and southern Brazil south to central Argentina. Open forest, savannah woodland, acacia scrubland, palm groves, farmlands, orchards and watercourses; particularly common in the vicinity of human habitation.

Habits

Highly gregarious; mainly sedentary but may travel long distances to feed. Monk parakeets are unique amongst Psittaciformes in that they build a nest from sticks rather than using an existing cavity. They prefer tall trees in open landscapes to mature forests and low, dense woodland (Sick 1993 cited in Campbell 2000).

Diet

Seed, grain, fruits, berries, nuts, leaf buds, blossom, insects and larvae.

Damage

Consumption of ripening cereal crops, particularly maize and sorghum (South America). Damage to citrus orchards. Crop losses in South America range from 2-15% with some as high as 45% annually. In the USA, where monk parakeets were introduced, the predicted widespread damage to commercial crops has not been realised. Monk parakeets are a problem, however, with their nest building activities that damage electricity utility structures leading to power outages. Also in the USA there is potential competition with native species, with (unsubstantiated) reports of killing blue jays and a robin. Species known to carry Newcastle disease and psittacosis. In Whipsnade Park, England, released, free-living monk parakeets were reported to damage orchards (Yealland 1958).

Introductions

USA, Spain, England, Italy, France, Belgium, Germany, Austria, Holland, Czech Republic.

GB sightings

Monk parakeets were kept at liberty in Whipsnade Park, Bedfordshire, for some time before 1958 (years unspecified) but were re-trapped because of the damage they caused to orchards in the surrounding area (Yealland 1958). Lever (1977) recorded thirty-one monk parakeets being released at Whipsnade in 1936, and that living-free had also occurred from time to time at Woburn. More recently, transient colonies have also previously occurred in Stoke-on-Trent, Tiverton in Devon (≤ 30 birds) and Barnton in Cheshire (9 birds) (Butler *et al.* 2002).

Latterly, a population of Monk parakeets has been present in Borehamwood, Hertfordshire since at least 1992 and has been breeding since 1996. One report suggests that the source of the colony was six birds released by an aviculturist in 1989 (www.hertsbirdclub.org.uk/monkparakeets.html). Recent (8th August 2007) discussions, however, between NEWMLS and the local Police Wildlife Crime Officer suggest that the original birds had escaped from a garden aviary during a burglary, rather than having been deliberately released by the owner. The population is reported to have increased to 15 birds by 1995, 24 birds by 1999 and a minimum of 45 birds by 2003 (www.hertsbirdclub.org.uk/monkparakeets.html).

Field investigations by NEWMLS found a large communal monk parakeet nest in a back garden in Borehamwood, and a second nesting site located approximately 0.8km away. Borehamwood residents perceived the population to currently (October 2007) be over 100 birds. The birds were reported to use gardens in a number of residential streets, and also to regularly use a park, in the north of Borehamwood (www.hertsbirdclub.org.uk/monkparakeets.html). Investigations by CSL confirmed at least 57 birds to be in the area during October 2007; 90 birds were estimated in February 2008 (NEWMLS).

Two other sites in London where monk parakeets have been reported in recent years are Mudchute Farm, Isle of Dogs and Lonsdale Reservoir, Barnes (www.hertsbirdclub.org.uk/monkparakeets.html). A sighting of at least five monk parakeets had been reported from Mudchute farm during June 2007 (www.birdguides.com). A disused and apparently abandoned nest was located in the area but there was no evidence of monk parakeets currently at the site (NEWMLS October 2007). Information from the resident ecologist at the London Wetlands Centre indicated that a pair of monk parakeets had been at Lonsdale Reservoir between 1996 and 2002. Since then there have been no further recorded sightings.

During 1975-2005, a total of 5,211 monk parakeets were imported into Great Britain.

5.12 ALEXANDRINE PARAKEET *Psittacula eupatria*

Large parakeet, Great-billed parakeet

The Alexandrine parakeet is classified as category E* by the BOU (see monk parakeet).

Distribution

Southern Asia: Sri Lanka to eastern Afghanistan and western Pakistan to Indochina and the Andaman Islands. Jungle, forest, mangroves, wooded country, cultivated farmland, parks, gardens, plantations, villages and urban areas.

Habits

Gregarious; mainly sedentary but with some nomadic movements.

Diet

Seeds, nuts, berries, fruits, blossom, grain, leaf buds and nectar.

Damage

Consumption and damage to orchard fruit and ripening crops, such as maize, wheat and rice.

Introductions

Pakistan and India. A favourite pet bird in India and Thailand. Populations around major cities, such as Karachi and Bombay may have originated from aviary escapes.

GB sightings

Breeding Alexandrine parakeets have been recorded in three locations. In 2002, two nests producing hybrid young (Alexandrine x ring-necked) were recorded in Sidcup, Kent. Three Alexandrine parakeets and three hybrids have been reported regularly at the ring-necked parakeet roost in Lewisham crematorium. The roost was believed to hold all ring-necked and Alexandrine parakeets living in south-east London (Butler *et al.* 2002).

A colony of up to 12 Alexandrine parakeets was present in Fazackerley, Merseyside. But in 1998 many of these birds were shot. In 1999, however, a surviving pair successfully bred. A pair also successfully fledged young in Foots Cray Meadows, Kent, during 2001.

5.13 BLUE CROWNED PARAKEET *Aratinga acuticaudata*

Blue-crowned conure

The blue-crowned parakeet is classified as category E* by the BOU (see monk parakeet).

Distribution

Eastern Columbia and northern Venezuela south to Paraguay, Uruguay and northern Argentina. Arid, tropical zone, thickets, grassland savannah, forest edge.

Habits

Gregarious. Seasonal movements.

Diet

Seeds, fruits, berries, nuts.

Damage

Widespread damage to ripening sorghum crops (Paraguay).

Introductions

No details on introductions available.

GB sightings

Blue crowned parakeets have been recorded in the Bromley/Lewisham area during 1997-2002. Sightings have involved a flock of up to 15 birds, and breeding attempts (unsuccessful) by two pairs. The birds are not believed to roost with ring-necked and Alexandrine parakeets at Lewisham Crematorium (Butler *et al.* 2002). A flock of 7 birds was reported in Lymington, Hampshire in 2002.

5.14 EAGLE OWL *Bubo bubo*

The eagle owl is classified as category E* by the BOU (see monk parakeet).

Distribution

Eurasia – North Africa, most of Europe (except some western and northern parts), to eastern Asia (except south-east), India, the Middle East and North Africa. Forests, steep rock and ravine regions, mountain cliffs.

Habits

Occurs singly or in pairs; sedentary.

Diet

Wide range of small mammals, game birds, wildfowl, gulls, other birds (including raptors), snakes, lizards, amphibians, fish, invertebrates.

Damage

Known to take the young and adults of almost all European raptors, up to the size of (and including) female goshawk *Accipiter gentiles* (Newton 1979).

Introductions

No details on introductions available. In the UK, however, eagle owls are very commonly kept in captivity. Over 2,000 licences to keep pet eagle owls were applied for between 1998 and 2003.

GB sightings

Around 20 eagle owls were believed to be living wild in Britain (Malcolm Ogilvie - Guardian December 2003). More recently, the UK400 Club, claim that there are 44 pairs breeding ferally in Britain (www.uk400clubonline.co.uk). The UK400 Club also believes that virtually all of these individuals are escaped or released birds (but see below). RSPB data, however, records a maximum of three nesting pairs in any one year during 1984-2007 (Holling *et al.* 2007). In England, there have been sightings of long-staying birds in Yorkshire, Lancashire and Warwickshire. A pair bred annually on MOD land in Catterick, North Yorkshire between 1996-2005, successfully rearing a total of 23 young. The female was shot in 2006. The fate of 20 of these offspring is unknown; three are known to have died (one shot near Masham, one flew into power lines in Shropshire, one found dead in Peebles). In 2007, another pair successfully

bred in Bowland Fells, Lancashire; after a failed attempt the previous year. There are reports of another two pairs (or singles) in the same area. Since 1999, there have been numerous sightings of individual birds (mostly from northern England), a number of which are known to have been escaped birds.

The presence of breeding eagle owls in the UK is a source of contention between different interest groups (see section 8). The issues being debated are whether or not all of the birds present in the wild are escaped/released birds or whether some individuals have colonised naturally from the Continent (the nearest wild breeding eagle owls are in The Netherlands and Belgium – Holling *et al.* 2007), and whether or not the eagle owl was historically part of the British avifauna.

5.15 **SACRED IBIS** *Threskiornis aethiopicus*

Distribution

Africa from south-western Mauritania, Senegal and Gambia East to Somalia, and Ethiopia and South to South Africa; south-eastern Iraq. Mainly coastal lagoons, marshes, damp lowlands, and agricultural areas (when flooded), but sometimes will travel far from water. Also garbage dumps and recently burned areas.

Habits

Sacred ibis live in large colonies near waterways; gregarious - living, travelling, and breeding in flocks; quiet, only grunting or a croaking on breeding grounds; both male and female feed the chicks, and take turns in guarding the nest site until the chicks are large enough to defend themselves.

Diet

Feeds on small animals, vertebrates, and invertebrates; including small fish, grasshoppers, locusts, insects and insect-larvae, amphibians, and other small aquatic animals. but it is an opportunistic eater that will take anything available, such as carrion, bird eggs and nestlings, or small mammals.

Damage

In some areas, it is a serious predator of other bird species (some of conservation concern) (Yesou & Clergeau 2006). In France, predation of eggs has been observed at a number of colonies of different species of terns (Sandwich *Sterna sandvicensis*, Black *Chlidonias niger*, Whiskered *Chlidonias hybridus* and Common *Sterna hirundo*). Other species whose nests have been predated are: mallard *Anas platyrhynchos*, black-winged stilts *Himantopus himantopus*, lapwings *Vanellus vanellus* and cattle egrets *Bubulcus ibis*; also competition for nest sites with cattle egrets and little egrets *Egretta garzetta*. There is also concern that observed predation of newts may have detrimental effects on discrete populations of these endangered amphibians. The French ministry has ordered a case study, which has proposed measures to be implemented in order to either control the population or eradicate it.

Introductions

Feral breeding populations have been established in Spain, Italy, France and Canary Islands as a result of escapes from captivity. Stray birds reported in other countries. In France, a breeding colony was established at a zoo in southern Brittany. This free-

flying population established a colony in the wild at Golfe du Morbihan on the French Atlantic coast; with breeding first noted in 1993. Further breeding colonies have been established at various sites along the French Atlantic seaboard. In 2005, the French Atlantic breeding population was estimated at a little over 1,100 breeding pairs. The total wintering population was estimated at 2,500 birds in 2003-04 and 3,000 birds in 2004-05. Birds are dispersing to northern Brittany and Normandy with increasing frequency; a few also move into eastern France. Sacred ibis are held in captivity in most European countries.

GB sightings

The 30-odd records (pre-2000) of sacred ibis in the UK were assessed as being of birds wandering from the French coastal colonies (Blair *et al.* 2000). No information, however, was provided as to how these birds were differentiated from potential escapees from captivity. Since 2000, there have been sightings along Norfolk's east coast (2001), inland in the Midlands and Yorkshire (2002), Ramsgate (2002), mid-Norfolk (2004) and along Norfolk's north coast (2007). The latter sightings involved an individual bearing a red coloured ring. The colour-ringing scheme used for sacred ibis in France, however, involves two or more colour rings on individual birds (www.cr-birding.be/). Therefore, the most recent (2007) sightings are most likely to have been of an escaped bird.

Sacred ibis in France are ringed with one of five different types of combinations, all ringed birds bearing at least two colour rings. Colours used are: red, orange, yellow, white, dark-green, light-green and dark -blue (www.cr-birding.be/).

6. Species evaluation – status and risk of establishment

A qualitative summary of the abundance and distribution of each species is presented in Table 1, along with details of their source, 'potential' detrimental impacts (i.e. those recorded in other countries) and 'actual' detrimental impacts (i.e. those recorded in England).

For avian species, there is evidence that monk, Alexandrine and blue-crowned parakeets and eagle owl are breeding (or attempting to breed) in the wild. The monk parakeet, in particular, has sustained a breeding population in Borehamwood, London, for around 15 years. The other avian species, the sacred ibis, is non-breeding and at present occurs only sporadically as a result of escapes from captivity and possibly from dispersal of birds from feral breeding colonies along the French Atlantic coast.

The mammal species (apart from edible dormouse) fall into two general categories, those that occur sporadically as a result of escapes from captivity; either from public collections or private owners. This includes raccoon, raccoon dog, skunk, coatimundi, chipmunk and sugar glider. The second category, are those species for which there is evidence for the past existence of established groups and breeding in the wild. This category includes prairie dog, short-clawed otter and red-necked wallaby. Confirmation of contemporary colonies and breeding is lacking with previous colonies of these species considered to have most probably died out.

Many different non-native species have escaped from captivity. Investigations of escaped non-native mammals in Britain recorded 39 species in the wild between

1970-1989 (Baker 1990) and 53 species between 1970-1999 (Baker & Hills 2008). These studies included data on the longest time that any individual of a given species was known to have survived out of captivity. Individuals from eight species survived for over a year; although it was recognised that efforts to recapture escapees were variable. Of the species under consideration in the present study (for which data was available) a raccoon survived for four years, a red-necked wallaby for two years and a prairie dog for 15 months. Established colonies of wallabies, however, are known to have persisted for over 50 years. Baker (1990) considered the raccoon to be a species that might have been expected to establish a population in Britain. Raccoons are adapted to a temperate environment and survive well out of captivity and were one of the more frequent escapees. In other western European countries, raccoon populations successfully established in Germany and expanded into Holland and France, following escapes in Germany (Lever 1985).

The probability of an individual species establishing a population in the wild, following escape, will depend on stochastic and ecological factors (Baker 1990). If there is no ecological constraint on survivorship, establishment will depend on the ability, for example, to encounter a mate. Such stochastic factors are likely to have constrained the establishment of a raccoon population in England. For those relevant species, it may only be a matter of time before establishment may occur, unless measures are taken to prevent escapes, or to ensure removal of escapees from the countryside.

The frequency of escapes by individuals of ecologically viable species will influence the likelihood of populations establishing. There are concerns from some wildlife organisations that recent removal of raccoon and coatimundi from the Dangerous Wild Animals Act may lead to increases in the ownership and subsequent increases in escapes and releases of these species.

If a species is ecologically constrained (e.g. food availability, temperature), however, establishment is only likely to occur under a particular set of favourable circumstances (Baker 1990). The views of an exotic species vet supported this opinion, that a number of species will be constrained from establishment. For example, some species are adapted to a specialist diet that is not available in the English countryside. Other species are social by nature and following escape attempt to seek out conspecifics, which inevitably means attempting to return to their enclosures.

Of the mammal species under consideration in the present study, only the edible dormouse has a well-established breeding population. An estimated population of at least 10,000 is largely restricted to the Chiltern area of Buckinghamshire, Berkshire and Hertfordshire (Harris *et al.* 1995; Morris 1997); but sightings have been reported from numerous other counties, up to 100km distant. Detailed information on the abundance and regional distribution of edible dormice outside of the Chiltern area is lacking.

Table 1. Summary of the abundance, distribution and source of selected non-native species, and their potential and actual detrimental effects.

Species	Population Status			Category	Detrimental Effects	
	Abundance	Distribution	Source		Potential	Actual
Raccoon	Infrequent – individuals	dispersed	Infrequent escapes/releases	Economic Environmental	Consumption of corn and peanuts; predation of gamebirds, waterfowl and other wildlife; potential carrier of rabies.	None
Raccoon dog	Rare – individuals	localised	Rare escapes/release	Economic Environmental Health	Predate game birds and waterfowl, displace badgers from burrows; damage vineyards; potential carrier of rabies.	None
Striped skunk	Infrequent – individuals	dispersed	Infrequent escapes/releases	Health	Potential carrier of rabies.	None
Coatimundi	Infrequent – individuals	localised	Infrequent escapes/releases	Economic Environmental	Depredations in orchards and chicken houses; (unconfirmed) depredation of island avifauna.	Predation of domestic fowl.
Siberian chipmunk	Infrequent – individuals/colonies	dispersed	Infrequent escapes/releases	Economic Environmental	Damage fruit & cereal crops; predation of birds and eggs.	None
Black-tailed prairie dog	Infrequent – individuals/colonies	dispersed	Infrequent escapes/releases	Economic	Consume or uproot various crops.	None
Short clawed otter	Infrequent – individuals/groups	localised	Infrequent escapes Bred in wild	None known	None known.	None
Edible dormouse	Abundant – individuals/colonies	localised	Breeding in wild	Economic	Bark stripping of plantation trees; damage to domestic buildings.	Damage to plantations and buildings.
Red-necked wallaby	Infrequent – individuals/colonies	dispersed/ localised colonies	Infrequent escapes Bred in wild	Economic Environmental	Damage crops, pasture and trees.	None
Sugar glider	Infrequent – individuals	localised	Infrequent escapes/releases	Environmental	Bark stripping of trees.	None
Monk parakeet	Regular – individuals/flocks	dispersed/ localised colonies	Breeding in wild Infrequent escapes	Economic Social Health	Damage fruit & cereal crops; damage electric utility structures; noise and droppings in urban environment.	Damage to orchards; noise and droppings in urban environment.
Alexandrine parakeet	Rare - individuals/flocks	localised	Breeding in wild Infrequent escapes	Economic	Damage to orchard fruit and ripening crops.	None
Blue-crowned parakeet	Rare - individuals/flocks	localised	Breeding in wild Infrequent escapes	Economic	Damage to ripening crops.	None
Eagle owl	Regular – individuals/pairs	dispersed/ localised breeding	Breeding in wild Regular escapes	Environmental Social	Predation of native species of birds and mammals; aggressive to people and domestic pets.	Predation of hen harriers; aggressive to people and pets.
Sacred ibis	Infrequent – individuals	dispersed	Infrequent escapes French migrants?	Environmental	Predation of endangered native species, e.g. terns, newts.	None

Population status:

Abundance: sightings are abundant, regular, infrequent or rare; involving single animals or groups (more than one individual)

Distribution: dispersed = sightings from a number of different regions; localised = sightings concentrated in a small number of regions.

Source: 'population' is maintained by breeding in the wild (edible dormouse & monk parakeet are self-supporting populations) or maintained by escapes/releases from captivity.

Detrimental Effects:

Category: economic, environmental, health and social.

Potential: detrimental effects attributed to the species in any of the countries (other than GB) where the species exists (i.e. effects that might also occur in GB).

Actual: those potential detrimental effects that have been recorded in GB.

Four of the species have exhibited some degree of negative economic, environmental or social impact. The edible dormouse causes the most significant impact with economic damage to buildings and woodlands. Monk parakeets are currently a source of social nuisance due to noise and faecal contamination in suburban areas; there are also historical records of damage caused to orchards. A breeding pair of eagle owls has apparently killed two hen harriers *Circus cyaneus* and a buzzard *Buteo buteo*, and there have been several reported incidents of owls harassing people and domestic animals. Coatimundi have predated domestic fowl in isolated incidents.

Detailed accounts of monk parakeet, edible dormouse and eagle owl are provided in the following sections. Feral breeding populations of edible dormouse and monk parakeet have been established in England for a number of years, whilst eagle owl has recently bred in the wild. In contrast, there is no evidence of feral breeding for coatimundi, which only occur in the wild sporadically as a result of escapes from captivity; this species, therefore, is not considered in further detail.

7. Monk parakeet

The only confirmed current population of monk parakeets has been present in Borehamwood, Hertfordshire since at least 1992 and has been breeding since 1996. There are two nesting sites approximately 0.8km apart. At least 57 birds were confirmed to be in the area during October 2007 (CSL data); although anecdotal reports from residents claimed a population of 100-150 birds. Subsequently, in February 2008, 90 birds were estimated (NEWMLS).

Mott (1973) reported that, in its native South America, the monk parakeet is regarded as a serious agricultural pest. In Uruguay, they are reported to do extensive damage to sunflowers and to also damage corn, apples and other fruit. In Argentina, monk parakeets have been blamed for crop losses (2%-15%), mostly corn and sunflower, with the occasional report of a 45% loss (Niedermeyer & Hickey 1977 cited in Stafford 2003). In Brazil, monk parakeets consumed maize, rice, sorghum and wild seeds (Fallavena & Silva 1988 cited in Campbell 2000). An alternative view of the monk parakeet's status as an agricultural pest in South America is that its reputation is overstated and undocumented (Bucher 1992, Pruett-Jones & Tarvin 1998; Spreyer 1998).

In the USA, although feral monk parakeets have been widely established since the early 1970s, they have not become agricultural pests at a national level (Stafford 2003). There have been relatively few reports of crop damage, although where it does occur it can be locally significant, such as in commercial fruit orchards in south Florida (Tillman *et al.* 2000). In Connecticut, there have been reports of parakeet damage to sweet corn (Avery *et al.* 2006), and sporadic reports of minor damage to gardens and ornamental trees (Pearson & Olivieri 1995 cited in Stafford 2003).

The main problem caused by monk parakeets in the USA relates to damage from nesting on electrical utility structures (transmission and distribution lines, and substations) (Avery *et al.* 2002, 2006). Monk parakeets are unique amongst Psittaciformes in that they build a nest from sticks rather than using an existing cavity (Forshaw 1989). Nest material can cause short circuits and electrical fires resulting in damage and power loss or cuts. Regular and persistent problems occur in a number of

states, notably Connecticut, Florida, Illinois, New York and Texas (Pruett-Jones *et al.* 2007). In south Florida, damage and associated power failures in the Florida Power & Light (FPL) service area have increased substantially over recent years. A preliminary estimate indicated that the total costs associated with power failures in 2001 were \$585,000 (A. Hodges and C. Newman cited in Avery *et al.* 2002). In Spain, the monk parakeet became established in Barcelona during the mid-1970s (Sol *et al.* 1997a). Since then, the Barcelona population has increased exponentially and expanded its range; monk parakeets have also been reported in Andalusia, Madrid, Murcia, and Valencia (Sol *et al.* 1997b cited in Campbell 2000). It is postulated that the Barcelona parakeets may act as a source population from which birds may disperse to surrounding non-urban areas, where the species may become an agricultural pest (Sol *et al.* 1997a). Modelling has suggested that, in Spain, the monk parakeet is still absent from 72% of potential settlement areas, and that a continuous increase in their distribution is expected (Munoz & Real 2006).

In Britain also, monk parakeets are presently limited to urban areas. There are some negative social impacts associated with the birds, which are very vocal with loud calls, especially in flight. Together with the deposition of droppings under nesting trees, they can cause nuisance in residential areas.

There is some historical evidence of monk parakeets causing crop damage in Britain. Free-living monk parakeets that had been turned out at Whipsnade Park had to be recaptured due to them causing "...so much damage in orchards for some distance around..." (Yealland 1958).

8. Eagle Owl

A pair of eagle owls is known to have been breeding successfully in Yorkshire since 1996. This recent establishment has been a cause of controversy over whether their presence in Britain represents an introduced non-native species, or a natural re-establishment of a formerly native species (Warburton 2006a, 2006b, 2007). One view is that fossil and archaeological evidence suggest that eagle owls, or a species of *Bubo* closely allied with modern the modern eagle owl, have been present in Britain for up to 700,000 years, through to the end of the last ice age and into the Holocene (Stewart 2007). Further, that some of the eagle owls in the wild today are the result of natural recolonisation from mainland Europe, where the population has both increased and spread westwards (Dennis 2005). The opposing view, however, is that there is no evidence for the eagle owl ever having been part of the British avifauna, and that the source of all birds present in the wild are the result of escapes or releases from captivity.

The British List – the official list of birds recorded in Britain, is maintained by the British Ornithologist' Union Record Committee (BOURC) (Dudley 2005). The Committee is responsible for the assignment of species to different categories on the List – categories A-E. The British List comprises those birds in categories A, B and C. These are species that have occurred in an apparently natural state (A and B), or although introduced now derive from the resulting self-sustaining populations (C). Category E species are those that have been recorded as introductions, human-assisted transportees or escapees from captivity, and whose breeding populations (if any) are thought not to be self-sustaining. Species in Category E that have bred in the wild in

Britain are designated as E*. Category E has been introduced to enable local and national recorders to monitor escaped species. The BOU does not consider that there is sufficient evidence to include the eagle owl on the British List and categorise the species as E* (www.rspb.org.uk/ourwork/policy/species/eagleowls.asp). The BOU Records Committee compiled a dossier on the eagle owl during an assessment of its status in 1996. An extensive review revealed around 90 reports of this species since 1684. After careful consideration, the BOU Committee concluded unanimously that many of the descriptions (where available) were not adequate to prove that eagle owl was the species concerned. Of those where the Committee accepted the identification as eagle owl, members were equally united in believing that the possibility of escapes and releases could not be dismissed (www.bou.org.uk/recrep23.html).

Irrespective of the provenance of eagle owls, a concern over their presence in Britain is their potential detrimental impact on the conservation status of a range of native species, through competition or predation (www.rspb.org.uk/ourwork/policy/species/eagleowls.asp). Reviewing raptor ecology, Newton (1979) reported studies showing 207 individuals of 13 raptor species in the diet of the eagle owl, including buzzard, kestrel *Falco tinnunculus*, goshawks and peregrine *Falco peregrinus*. Raptors, however, only formed 3-5% of the eagle owl's diet, and 23-26% of its bird prey. Warburton (2006) citing the prey data of H. Mikkola stated that owls and diurnal raptors only constitute 2.2% of the eagle owl's diet and 5.2% 'other' birds such as corvids and pigeons. Although, eagle owls do predate other raptor species, their diet is dominated by mammals, which in European studies ranged from 62% to 94% (studies cited in Martinez *et al.* 1992). In Murcia, Spain, rabbit *Oryctolagus cuniculus* was the main prey species, comprising 81% of the diet (Martinez *et al.* 1992). Although, the Catterick breeding pair also was reported to have fed almost exclusively on rabbits (Warburton 2006), little is known about what eagle owls eat in Britain. In 2007, the remains of two hen harriers and a buzzard were discovered at the nest of the breeding pair in Bowland Fells, Lancashire.

9. Edible dormouse

The edible dormouse was introduced into Britain in 1902 as part of a wildlife collection, at Tring Park, Hertfordshire. Escapes from this collection led to the establishment of a population in the wild. Following their introduction, edible dormice multiplied quickly and caused considerable damage to thatch and to corn and other crops (Harris *et al.* 1995). Following a failed attempt to eradicate them, the species was still recorded in Tring Park. Subsequently, there has been a steady increase in numbers of edible dormouse. In the first 85 years the average rate of spread was about 380m per year, with most records still within 25km of Tring Park (Jones-Walters & Corbet 1991).

Reviewing the status of the edible dormouse, Morris (1997) recorded that distribution surveys (Thompson 1953, Jones-Walters 1990 cited in Morris 1997) indicated that the species was confined to woodlands in the Chiltern area, within about 35km of its point of introduction, but with a few outlying records west to Bledlow Ridge, east to Potters Bar and south to High Wycombe. A more recent postal questionnaire, in 1995, confirmed the pattern but added a significant number of 1km squares to the previous distribution; one record was from as far as Stevenage. The majority of 1995 records (78%) were from houses; only 10% were from woodlands and 11% from gardens.

It was thought that the spread of the species was limited by the open countryside of the Vale of Aylesbury to the north-west and urbanisation to the south. However, illegal translocations occur (homeowners releasing trapped individuals) and are likely to increase the distribution in a stepwise manner rather than through a steady spread (Pat Morris cited in Battersby 2005). As an introduced species, it is listed on Schedule 9 of the Wildlife and Countryside Act, which means that once trapped it is illegal to release it back into the wild. A number of widespread, but isolated reports suggest that it has been translocated (accidentally or deliberately) considerable distances from its point of introduction, including Oxford (45km west) and the New Forest (100km south west). Harris *et al.* (1995) also report an outlying record from Sandy, Bedfordshire in 1974, and earlier records from Shropshire, Warwickshire, Wiltshire and Worcestershire, with unconfirmed reports in Gloucestershire, Hampshire, Northamptonshire, Oxfordshire and Surrey.

At present, however, the main population has a restricted distribution in the Chiltern area of Buckinghamshire, Berkshire and Hertfordshire (Battersby 2005). The current population is estimated to number at least 10,000 animals (Harris *et al.* 1995).

There has been little monitoring of individual sites, but data from Pat Morris, described in Battersby (2005), indicate that numbers fluctuate widely between years due to immigration/emigration associated with breeding and suppressed breeding, in turn linked to annual beechmast production. In non-mast years it is considered likely that dormice migrate into buildings. Problems in domestic buildings, in particular gnawing of electric cables, were well documented from 1935 onwards, and between 1943 and 1961 nearly 600 were trapped in houses in the Amersham area alone (Morris 1997).

The edible dormouse can cause serious damage to growing timber by stripping the bark from trees. In Northern Tuscany, during the early 1970s, increases in the edible dormouse population impacted considerably on the cultivation of pine. Between 1969 and 1975, an annual reduction in pine production of 1,550 tonnes (110 million lira) was attributed to the edible dormouse (Santini 1978). In England, damage to forestry interests is significant, with Norway spruce aged 15-30 years and European Larch aged 28-35 years the principal trees affected (Morris 1997). Damage caused by gnawing off strips of bark can lead to fungal infections and the death of the tree crown can occur. Minor damage also occurs to Scots Pine *Pinus sylvestris* and birch *Betula pendula*. Fruit trees and stored fruit are also damaged; although orchards are of declining significance in the Chilterns (Morris 1997). A survey in Forestry Commission woods revealed that 15% to 70% of the trees in individual stands had been gnawed by edible dormice.

UK legislation toward the edible dormouse could be improved. The species is both protected (Berne Convention and Section 11(2) Wildlife and Countryside Act 1981) and controlled (Section 14(1) Wildlife and Countryside Act 1981); possibly contributing to little attempt to eradicate this species in recent years (Huckle 2002). The species is listed under Section 14(1)(b) of the Wildlife and Countryside Act 1981, which prohibits its release into the wild in Great Britain. It is categorised under Part 1 Schedule 9, i.e. the species is known to be established in the wild and causing environmental damage. All dormice are protected under Section 11(2) of the Wildlife and Countryside Act 1981 in that certain methods of killing or taking are prohibited

unless a licence has been issued. Occupiers of land may, however, kill or take edible dormice by any non-prohibited method, such as shooting, without needing a licence (www.defra.gov.uk/wildlife-countryside/vertebrates/glisglis.htm). If a dormouse problem cannot be resolved without resorting to a prohibited method (e.g. trapping), a licence may be issued to permit use of such a method. The Natural England Wildlife Licensing Unit administers all licence applications. This includes licences to prevent damage to forestry and to residential and industrial property. The Unit's records indicate that, between 1993-94 and 2005-06, all license applications were received from within the edible dormouse's main population range within Buckinghamshire, Berkshire and Hertfordshire. Three applications have come from outside this area – two from Bedfordshire and one from Wiltshire.

10. Sources of escaped/feral non-native species

Considering non-native mammalian species, Baker (1990) identified that one way to predict which species are likely to establish a feral population in Britain is to monitor those that escape from captivity. The frequency of escapes by a species represents a measure of the opportunity for that species to establish a feral population. Whilst, the geographic distribution of escapes will indicate those regions in which such a population could occur.

Baker (1990) identified seven purposes for holding non-native species: for display to the public (zoos and wildlife parks), as performing animals (circuses), for sale in shops, in quarantine, for research purposes, to be commercially bred for their meat or pelts, or held privately as pets or as part of a collection. For the species being considered in the present study the sources are zoos, animal sanctuaries and private owners. Between 1970-1989, zoos/wildlife parks and private collections accounted for approximately 65% and 70% of known incidents of escapes and escaped individuals respectively (Baker 1990).

10.1 Zoos

The Zoo Licensing Act was enacted in 1981 and came into force in 1984. Under the Act a zoo is defined as being '...an establishment where wild animals are kept for exhibition ... to which members of the public have access, with or without charge for admission, seven or more days in any period of twelve consecutive months'. In this context a 'wild animal' is an individual of any species that is 'not normally domesticated in Great Britain'. The Zoo Licensing Act 1981 requires the inspection and licensing of zoos in Great Britain. The Act, however, allows dispensations for small zoos (holding species that are non-hazardous and without conservation value) to reduce the frequency of inspection visits or indeed permit exclusion from the Act itself. Local authorities are responsible for administering the Act, usually the District Council's Environmental Health Department. An annual stock-list of animals kept in each zoo is recommended (although not mandatory) under Section 9.5 of the Secretary of State's Standards of Modern Zoo Practice; copies of stock-lists are held by the relevant licensing authorities. A number of zoos publish their annual report, including animal inventories, on the internet. There is, however, no centrally held database containing the animal inventories for all the zoos.

Defra lists 270 licensed zoos operating in England (November 2007) (www.defra.gov.uk/wildlife-countryside/gwd/pdf/zoos-list.pdf).

10.2 Animal sanctuaries

At present there is no regulation of animal sanctuaries in the UK, and thus anyone can call their home or premises a sanctuary. There was a proposal in the Draft Animal Welfare Bill 2004 to license/register animal sanctuaries (www.archive2.officialdocuments.co.uk/document/cm62/6252/6252.pdf). The proposal was for animal sanctuaries to be regulated through a two-tier system of registration and licensing, dependent on the size of the sanctuary, rather than the species held - larger sanctuaries would be licensed (renewed every 18 months) and smaller sanctuaries registered (a one off registration fee). Defra stated that the number of animal sanctuaries in England and Wales is unknown, but reported a conservative estimate of 700 – half of which were estimated to be subject to licensing and half to registering. Under the subsequent Animal Welfare Act 2006 (www.newc.co.uk/home/documents/AnimalWelfareAct.pdf?PHPSESSID=a71ab1a9907ce550f3eeaa0bb9564bc4), there are provisions for licensing/registering a number of activities involving animals, but which await secondary legislation. The timetable for introduction of secondary legislation is under review. Until the relevant secondary legislation is introduced, animal sanctuaries remain unregulated.

10.3 Private owners

Under the Dangerous Wild Animal Act 1976, private owners of all animals that are legally deemed to be dangerous are required to annually buy a licence from their local authority. The Act was intended to regulate the keeping of certain kinds of dangerous wild animals in order to protect the public; it holds no bearing on a species potential invasiveness. There is no central database of animals kept under the Act.

In 2000, Greenwood *et al.* (2001) conducted a questionnaire survey of all 410 local authorities in England and Wales (95% response rate), which revealed a total of 375 licenses (issued by 205 local authorities) for a total of 11,878 animals. Most (89%) of these animals were farmed species (wild boar, ostrich, guanaco, emu and bison). Outside of farmed species, the most frequently licensed animals were primates (655), followed by carnivores (269) and venomous snakes (334).

For the Scheduled mammalian species under consideration in the present study a 1988 survey (returns from 76% of licensing authorities) revealed 37 (19 licenses) raccoons, 23 (12 licenses) coatimundis and 8 (3 licenses) Asian short-clawed otters (Baker 1990, Greenwood *et al.* 2001), and a survey in 2000 (returns from 95% of licensing authorities) revealed 30 raccoons and 30 coatimundis (Greenwood *et al.* 2001).

The Schedule of Controlled Species was amended in 2007 with 33 species no longer considered to present a threat as dangerous wild animals removed from the Schedule, including raccoon and coatimundi, and no longer requiring a licence. This removal does not imply that they do not pose a continued risk as invasive species (raccoon is listed as invasive in Europe), and their release would remain an offence under the Wildlife and Countryside Act 1981. Recent removal of species from the Act is a concern in some quarters (e.g. RSPCA) as it is believed that this may increase the ownership and subsequent abandonment of some removed species, such as raccoon and coatimundi. These concerns appear to be based on the premise that removal of the requirements under the Act for prospective owners of these species to purchase a

license and to pass a veterinary inspection of the animal's proposed housing facilities is considered likely to promote increased ownership.

A number of bodies, including the pet trade, the National Association of Private Animal Keepers (NAPAK), the British Herpetological Society (BHS) and the International Herpetological Society (HIS) believe there is mass non-compliance of the Dangerous Wild Animals Act (Greenwood *et al.* 2001). The degree of non-compliance is believed as high as 85-95% of all dangerous wild animals owned in Britain; although there is no way to validate this estimate. Non-compliance is more likely to be more prevalent in respect to reptiles than for mammals and birds, as reptiles are usually housed indoors and out of sight.

With respect to birds of prey, an audit of the current status of falconry in the UK has recently been conducted by the Hawk Board (Fox & Chick 2007). An estimated 25,000 people keep diurnal or nocturnal birds of prey. The total number of raptors in captivity is estimated at about 70,000. In 2005, about 2,320 individuals of Schedule 4 species were bred in captivity and probably 12,000-15,000 raptors of non-registerable species were bred. Around 1,500-2,000 people breed birds of prey, with the numbers bred per year increasing at a rate of 11% per annum.

The eagle owl has been known in captivity in this country since at least the 17th century and many were brought from India during the 19th century (www.rspb.org.uk/ourwork/policy/species/eagleowls.asp). Eagle owls are very commonly kept in captivity - often by people who are not falconers. Over 2,000 licences to keep pet eagle owls were applied for between 1998 and 2003. Escapes of privately owned raptors are a regular occurrence. In 2005-06, 250 lost raptors were reported to the Independent Bird Register. Of these, 64 were native, 130 non-native and 57 hybrids. About 187 non-native or hybrid raptors are lost in UK every year. Many are quickly recovered and many die. Only the eagle owl is known to have bred successfully in the wild.

11. Conclusions

- Monk parakeet, Alexandrine parakeet, blue-crowned parakeet and eagle owl are currently breeding (or attempting to breed) in the wild.
- Sacred ibis occur sporadically as individuals as a result of escapes from captivity and possibly from dispersal of birds from French feral breeding colonies. They can have detrimental impacts on other colonial nesting birds, such as terns.
- Raccoon, raccoon dog, skunk, coatimundi, chipmunk and sugar glider occur sporadically as a result of escapes from captivity. There is no evidence of breeding in the wild.
- For prairie dog, short-clawed otter and red-necked wallaby there is evidence for the past existence of established groups or breeding in the wild. Confirmation, however, of contemporary colonies and breeding is lacking.
- Four species have currently exhibited some degree of negative economic, environmental or social impact; edible dormouse, monk parakeet, eagle owl and

coatimundi; although numbers of the latter three species are small. The risks from these species have the potential to increase if numbers expand.

- The edible dormouse causes the most significant current impact with economic damage to buildings and woodlands.
- Edible dormouse has an estimated population of at least 10,000, largely restricted to the Chilterns (Buckinghamshire, Berkshire and Hertfordshire); sightings, however, have been reported from up to 100km distant.
- Monk parakeets are a current source of social and health nuisance due to noise and faecal contamination in suburban areas; their large nests may become a nuisance in future. There is historical evidence of damage to orchards from free-living birds in England.
- The monk parakeet appears to have a self-sustaining population, but is low in numbers and has a very restricted distribution.
- A breeding pair of eagle owls has apparently killed two hen harriers and a buzzard; eagle owls have also harassed people and domestic animals. This species is a top predator and its impacts on native species remain uncertain if numbers spread. Eagle owls are a popular captive raptor and numerous future escapes are inevitable.
- Coatimundi have predated domestic fowl in isolated incidents. Together with raccoons and raccoon dogs they have the potential to become important medium sized predators with potential effects on native wildlife.
- The other species investigated in this study, if currently present in the wild, are in very small and isolated numbers, with no evidence of any current detrimental impacts.
- It is recommended, however, that the free-living status of these species (and other terrestrial non-native vertebrates) is regularly monitored. This can be achieved by establishing and maintaining a database of sightings, that will provide information on any developing patterns in the frequency and distribution of species records. Such a database, based on proactive searching of web news articles and specialist web sites, would expand on the existing NEWMLS non-native database and the developing web portal proposed under the GB IAS Strategy.
- There is an absence of centrally held data in a number of areas that are relevant to the issue of escaped non-native species, including a central database of the numbers of individuals of all species held by zoos, wildlife parks and animal sanctuaries, and a central database of licenses granted under the Dangerous Wild Animals Act and an assessment of the scale and nature of the non-native pet trade.
- The development and maintenance of such databases would facilitate an assessment of the spatial distribution of the risk of escapes and establishment of non-native species. For zoos and the DWA, lists of the numbers of animals are held by the relevant local authorities but are not collated centrally. A centralised

database would, for example in the case of the DWA, allow easier and more efficient monitoring of trends in the numbers of species held under licence; although it would not enhance the amount of data held.

12. 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 (1999) *The Atlas of European Mammals*. Poyser/Academic Press, London, pp. 194-195.
- Anon 2007. *The Invasive Non-native Species Framework Strategy for Great Britain*. (Draft). Defra.
- Atkinson, I.A.E. 1996. Introductions of wildlife as a cause of species extinctions. *Wildlife Biology* 2: 135-141.
- Avery, M.L., Greiner, E.C., Lindsay, J.R., Newman, J.R. & Pruett-Jones, S. 2002. Monk parakeet management at electric utility facilities in South Florida. *Proceedings 20th Vertebrate Pest Conference*: 140-145. University of California, Davis.
- Avery, M.L., Lindsay, J.R., Newman, J.R., Pruett-Jones, S. & Tilman, E.A. 2006. Reducing Monk parakeet impacts to electric utility facilities in South Florida. In: Feare, C.J. & Cowan D. P. (eds.) *Advances in Vertebrate Pest Management IV*: 125-136. Filander Verlag, Furth, Germany.
- Baker, S.J. 1990. Escaped exotic mammals in Britain. *Mammal Review* 20 (2/3): 75-96.
www.defra.gov.uk/wildlife-countryside/vertebrates/pdf/exotic-mammal-review.pdf
- Baker, S.J. & Hills, D. 2008. Escapes and Introductions. Pp. 780-794. In: *The Mammals of the British Isles: Handbook, 4th Edition* (Eds. Harris, S. & Yalden, D). The Mammal Society, Southampton.
- Battersby, J. (Ed.) & Tracking Mammals Partnership. 2005. UK Mammals: *Species Status and Population Trends. First Report by the Tracking Mammals Partnership*. JNCC/Tracking Mammals Partnership, Peterborough.
- Blair, M.J., McKay, H., Musgrove, A.J. & Rehfisch, M.M. 2000. Review of the status of introduced non-native waterbird species in the Agreement area of the African-Eurasian Waterbird Agreement. British Trust for Ornithology, Thetford.
- Bomford, M. & Hart, Q. 2002. Non-indigenous vertebrates in Australia. Pp 25-44 In: *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (Ed. D. Pimentel). CRC Press LLC.
- Bucher, E.H. 1992. Neotropical parrots as agricultural pests. Pp 201-219 In: S.R.Beissinger and N.F.R. Snyder, eds., *New World Parrots in Crisis: Solutions from Conservation Biology*. Smithsonian Institution, Washington, DC.
- Butler, C. 2002. Breeding parrots in Britain. *British Birds* 95: 345-348.

- Butler, C.J. 2005. Feral Parrots in the Continental United States and United Kingdom: Past, Present, and Future. *Journal of Avian Medicine and Surgery*, 19 (20): 142–149.
www.bioone.org/perlserv/?request=get-pdf&doi=10.1647%2F183
- Butler, C., Hazlehurst, G. & Butler, K. 2002. First nesting of Blue-crowned Parakeet in Britain. *British Birds* 95: 17-20.
- Campbell, T.S. 2000. The Monk Parakeet, *Myiopsitta monachus*. Institute for Biological Invasions. Invader of the Month.
<http://invasions.bio.utk.edu/invaders/monk.html>
- Clout, M.N. 2002. Ecological and economic costs of alien vertebrates in New Zealand. Pp 185-193 In: *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (Ed. D. Pimentel). CRC Press LLC.
- Dennis, R. 2005. The eagle owl has landed. *BBC Wildlife* 23 (13): 24-29.
- Diamond, J.M. 1984. Introductions, extinctions, exterminations and invasions. In *Normal extinctions of isolated populations* (Ed. M.H. Nitecki), pp. 191-246. Chicago University Press, Chicago.
- Dudley, S.P. 2005. Changes to Category C of the British List. *Ibis* 147:803-820.
- Dunstone, N. 1983. *The Mink*. T. & A. D. Poyser, London.
- English Nature (Rural Development Service). Summary of reports of exotic species sighting/evidence - 1st January 2001 to 31st December 2006.
www.defra.gov.uk/wildlife-countryside/vertebrates/reports/ExoticsSummary2006.pdf
- 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 (Abstract). *Biological Conservation* 101: 229-238.
- Forshaw, J.M. 1989. *Parrots of the World*. Blandford, London.
- Forstmeier, W. & Weiss I. 2002. Effects of nest predation in the Siberian chipmunk on success of the dusky warbler breeding (Abstract). *Zoologicheskii Zhurnal* 81: 1367-1370.
- Forstmeier, W. & Weiss, I. 2004. Adaptive plasticity in nest-site selection in response to changing predation risk (Abstract). *Oikos* 104: 487-499.
- Fox, N.C. & Chick, J. 2007. *Falconry in the United Kingdom: An audit of the current position prepared by the Hawk Board*. © Hawk Board Publications.
- Gosling, L.M. & Baker, S.J. 1987. Planning and monitoring an attempt to eradicate coypus from Britain. *Zoological Symposium No. 58*: 99-113. The Zoological Society of London.

- Gosling, L.M. & Baker, S.J. 1989. The eradication of muskrats and coypus from Britain. *Biological Journal of the Linnean Society* 38: 39-51.
- Greenwood, A.G., Cusdin, P.A. & Radford, M. 2001. Effectiveness Study of the Dangerous Wild Animals Act 1976. Defra Research Contract CR0246.
- Harris, S., Morris, P., Wray, S. & Yalden, D. 1995. A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC, Peterborough.
- Holling, M. and the Rare Breeding Birds Panel 2007. Non-native breeding birds in the United Kingdom in 2003, 2004 and 2005. *British Birds* 100: 638-649.
- Huckle, J. 2002. *Glis glis* (Linnaeus 1766) Fat Dormouse: Invasive Alien Terrestrial Animal Species. Fact sheet: TA/M/15. The Invasive Alien Species Project. www.138.253.199.114/IAAP%20Web/IAAPwebsite/FactSheet/Dormouse.doc
- Jones-Walters, L.M. & Corbet, G.B. 1991. Fat dormouse *Glis glis*. Pp 264-267 In: *The handbook of British mammals* (Ed. G.B. Corbet & S. Harris). Blackwell Scientific Publications, Oxford.
- Lever, C. 1979. *Naturalised animals of the British Isles*. Paladin, Granada Publishing, London.
- Lever, C. 1985. *Naturalised Mammals of the World*. Longman, London.
- Long, J. L. 1981. *Introduced birds of the world*. Universe Books, New York.
- Long J L 2003. *Introduced Mammals of the World: Their history, distribution and influence*. CABI Publishing, Oxford.
- Manchester, S.J & Bullock, J.M. 2000. The impacts of non-native species on UK biodiversity and the effectiveness of control. *Journal Applied Ecology* 37: 845-864.
- Martinez, J.E., Sanchez, M.A., Carmona, D., Sanchez, J.A., Ortuna, A. & Martinez, R. 1992. The ecology and conservation of the Eagle Owl *Bubo bubo* in Murcia, south-east Spain. In: *UK Nature Conservation No. 5* (Eds. C.A. Galbraith, I.R. Taylor, S. Percival & S.M. Davies). JNCC Publications, Peterborough.
- Merdith, A. 2002. Chipmunks. In: Meredith A & Redrobe S. *BSAVA Manual of Exotic Pets*, 4th Ed., British Small Animals Veterinary Association.
- Morris, P. A. 1997. A review of the fat dormouse (*Glis glis*) in Britain. *Nat. Croat.* 6(2): 163-176.
- Mott, D. 1973. Monk parakeet damage to crops in Uruguay and its control. *Proceedings Bird Control Seminar* 6; 79-81.
- Munoz, A.R. & Real, R. 2006. Assessing the potential range expansion of the exotic monk parakeet in Spain. *Diversity and Distributions*, 12 (6), 656-665.

- Newton, I. 1979. *Population ecology of Raptors*. T. & A.D. Poyser, London.
- Ogilvie, M. and the Rare Breeding Birds Panel. 2003. Non-native Birds Breeding in the UK 2001. *British Birds* 96: 620-625.
- Ogilvie, M. and the Rare Breeding Birds Panel. 2004. Non-native Birds Breeding in the UK 2002. *British Birds* 97: 633-637.
- Pimentel, D, Lach, L, Zuniga, R. & Morrison, D. 2002a. Environmental and economic costs of non-indigenous species in the United States. Pp 285-303 In: *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (Ed. D. Pimentel). CRC Press LLC.
- Pimentel, D., McNair, S., Janecka, J., Wightman, J., Simmonds, C., O'Connell, C., Wong, E., Russel, L., Zern, J., Aquion, T. & Tsomondo, T. 2002b. Economic and environmental threats of alien plant, animal and microbe invasions. Pp 307-329 In: *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (Ed. D. Pimentel). CRC Press LLC.
- Pruett-Jones, S., Newman, J.R., Newman, C.M., Avery, M.L. & Lindsay, J.R. 2007. Population viability analysis of monk parakeets in the United States and examination of alternative management strategies. *Human-Wildlife Conflicts* 1(1); 35-44.
- Pruett-Jones, S. & Tarvin, K.A. 1998. Monk parakeets in the United States: population growth and regional patterns of distribution. *Proceedings 18th Vertebrate Pest Conference*: 55-58. University of California, Davis.
- Santini, L. 1978. Biology, damage and control of the edible dormouse (*Glis glis* L.) in central Italy. *Proceedings 8th Vertebrate Pest Conference*: 78-84. University of Nebraska, Lincoln.
- SNH 2002. SSSI management statement: Inchtavannach and Inchconnachan SSSI. SNH Ref No: 808 15/03/2002.
- Sol, D., Santos, D.M. Feria, E. & Clavell, J. 1997a. Habitat selection by the monk parakeet during colonization of a new area in Spain. *The Condor*, 99: 39-46.
- Spreyer, M. 1998. The Monk Parakeet: guilty until proven innocent? www.monkparakeet.com/spreyer.htm
- Stafford, T. 2003. Pest risk assessment for the monk parakeet in Oregon. www.oregon.gov/OISC/docs/pdf/monkpara.pdf
- Stewart, J.R. 2007. The fossil and archaeological record of the Eagle Owl in Britain. *British Birds* 100: 481-486.
- Thompson, H.V. 1953. The edible dormouse (*Glis glis* L.) IN England, 1902-1951. *Proceedings of the Zoological Society, London* 122: 1017-1024.

- Tillman, E.A., Van Doom, A. & Avery, M.L. 2000. Bird damage to tropical fruit in south Florida. Proceedings Eastern Wildlife Damage Management Conference 9: 47-59.
- Verbeyen G. 2001. Investigation of the Asian chipmunk in De Panne (Belgium). Summary of project on www.squirrelweb.co.uk/articles/aliens
- Vitousek, P.M., Mooney, H.A., Lubchenco, J. & Melillo, J.M. 1997. Human domination of Earth's ecosystems. *Science* 277: 494-499.
- Warburton, T. 2006a. Eagle owls in the UK – where does the Trust stand? *World Owl Trust Newsletter* 32 (winter): 8-9.
- Warburton, T. 2006b. Eagle owls in the UK – what happened next? *World Owl Trust Newsletter* 33 (spring): 17-19.
- Warburton, T. 2007. Feathers fly over eagle owls once again! *World Owl Trust Newsletter* 36: 20-21.
- White, P.C.L. & Harris, S. 2002. Economic and environmental costs of alien vertebrate species in Britain. Pp 113-149 In: *Biological Invasions - Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (ed. D. Pimentel). CRC Press, Boca Raton, Florida.
- Wittenberg, R. & Cock, M.J.W. 2001. *Invasive Alien Species: A Toolkit of Best Prevention and Management Practices*. CAB International, Oxon, UK.
- Yalden, D.W. 1988. Feral wallabies in the Peak District, 1971-1985. *Journal of Zoology, London* 215: 369-374.
- Yealland, J.J. 1958. *Cage Birds in Colour*. H.F. & G. Witherby Ltd., London.
- Yesou, P. & Clergeau, P. 2006. Sacred Ibis: a new invasive species in Europe. *Birding World* 18(12): 517-526.
www.birdingworld.co.uk/images/SacredIbises.pdf

Annex I:

Summary tables of sightings of non-native species

(Tables A1-A15)

Table A1. Details of sightings of raccoon in England.

RACCOON <i>Procyon lotor</i>					
Individuals	Location	Date	Sightings	Details	Reference
1	Angmering, W. Sussex	December 2006	No details	RDS consider species ID inconclusive	RDS 2001-2006 summary www.defra.gov.uk/wildlife-countryside/vertebrates/reports/ExoticsSummary2006.pdf
1	Canterbury, Kent	April 2004	No details	RDS consider species ID inconclusive	RDS 2001-2006 summary www.defra.gov.uk/wildlife-countryside/vertebrates/reports/ExoticsSummary2006.pdf
2	Ilfracombe, Devon	10 April 2004	Member of public witnessed search for pair of escaped raccoons	Escaped from Combe Martin Wildlife Park	www.beastwatch.co.uk/Devon.htm#RACCOONS - BBC News (April 2004)
1	Scaldwell, Nthants.	December 2003	Motorist saw raccoon running along country lane	No further details	www.beastwatch.co.uk/Northamptonshire.htm#RACCOON - Northampton Today (15/12/03)
1	Bushby, Leics.	11 Nov. 2003	Feeding in garden	Allegedly filmed by resident	www.beastwatch.co.uk/Leicestershire.htm#RACCOON2 - Leicester Mercury (14/11/03)
1	Belton, Leics.	October 2000?	Following Loughborough sighting	See below	www.beastwatch.co.uk/Leicestershire.htm#RACCOON
1	South Loughborough, Leics.	October 2000?	Following Loughborough sighting	See below	www.beastwatch.co.uk/Leicestershire.htm#RACCOON
1	Barrow Upon Soar, Leics.	October 2000?	Following Loughborough sighting	See below	www.beastwatch.co.uk/Leicestershire.htm#RACCOON
1	SW Loughborough, Leics.	October 2000?	Walking along garden wall	No further details. Three further reports (above) following local newspaper article on this sighting.	www.beastwatch.co.uk/Leicestershire.htm#RACCOON - Rutland & Leicestershire Panther Watch
13	UK	2000-2007	'...wild inhabitants of Leicestershire include numerous raccoons...'	Numerous newspapers reporting Beastwatch survey.	Sept. 2006: Yorkshire Post, Coventry Evening Telegraph, PA News, Birmingham Post - www.beastwatch.co.uk
1 ♀	near Sheffield	1984	Escaped pregnant female	Thought to have given birth to 2 young	Long 2003, Baker & Hills (2008)
34	England	1970-2006	32 sightings involving 34 individuals.	No details	Baker & Hills (2008)

 Sightings of same individual

Table A2. Details of sightings of raccoon dog in England.

RACCOON DOG <i>Nyctereutes procyonoides</i>					
Inds.	Location	Date	Sightings	Details	Reference
1	Reading, Berks.	July 2005	Photographed	RDS confirmed species ID	RDS 2001-2006 summary www.defra.gov.uk/wildlife-countryside/vertebrates/reports/ExoticsSummary2006.pdf
1	Near Loch Lomond	1990s	Killed near Loch Lomond	No details	CSL 2007
1	No details	1979-2006	2 sightings involving 2 individuals	No details	Baker & Hills (2008)

 Possibly sightings of same individual

Table A3. Details of sightings of skunk in England.

SKUNK <i>Mephitis mephitis</i>					
Inds.	Location	Date	Sightings	Details	Reference
1*	Chapelton, Sheffield	5 Nov. 2007	Hiding in a garage, Westbury Avenue	4-5 month old; collected by RSPCA	www.thestar.co.uk/news/Skunk-found-hiding-in-garage.3442729.jp - 'Skunk found hiding in garage'
1	Blackpool	12 Sept. 2007	Mardi Gras Club, Talbot rd., Blackpool	Skunk spotted on street outside nightclub in early hours; handed to RSPCA	WWW.news.bbc.co.uk/1/hi/england/lancashire/6991156.stm - 'Skunk kicks up stink at nightclub'
9	?	2003	Escaped/abandoned	Incidents attended by RSPCA	Guardian August 2003 – 'Skunks allure is heaven scent, owners told'
10	?	2002	Escaped/abandoned	Incidents attended by RSPCA	Guardian August 2003 – 'Skunks allure is heaven scent, owners told'
6	?	2001	Escaped/abandoned	Incidents attended by RSPCA	Guardian August 2003 – 'Skunks allure is heaven scent, owners told'

* third skunk to be collected by the RSPCA in the UK in the last five months (2007).

Table A4. Details of sightings of coatimundi in England.

COATIMUNDI <i>Nasua nasua</i>					
Inds.	Location	Date	Sightings	Details	Reference
1	Barrow-in –Furness, Cumbria	?	In Barrow Park	Mentioned in Lindale sighting	http://www.nwemail.co.uk/news/viewarticle.aspx?id=397626
1	Barrow-in –Furness, Cumbria	?	Playground, Chetwynde school	Mentioned in Lindale sighting	http://www.nwemail.co.uk/news/viewarticle.aspx?id=397626
1	Barrow-in –Furness, Cumbria	?	At tarn at Great Urswick	Mentioned in Lindale sighting	http://www.nwemail.co.uk/news/viewarticle.aspx?id=397626
1	Lindale, Cumbria	August 2006	In garden at Low Farm Close, Lindale	Captured and sent to South Lakes Wild Animal. Park claims coati was not an escapee.	http://www.nwemail.co.uk/news/viewarticle.aspx?id=397626 also repeated at: http://scottishbigcats.co.uk/crypto28.htm http://www.cryptomundo.com/cryptozoo-news/coatisx/
1	South Lakes Wild Animal Park, Cumbria	August 2006	Zoo inspectors probe of 'recent' escapes of coati and lemur from South Lakes Wild Animal Park.	Barrow Borough Council investigation of escapes – September 2006	NEWMLS 2007 http://www.nwemail.co.uk/news/viewarticle.aspx?id=399159 http://www.nwemail.co.uk/news/viewarticle.aspx?id=409204
1	Barrow-in-Furness, Cumbria	Aug. 2006 (Dec 2005)	Discovered in turkey pen on farm, Barrow-in-Furness (killed turkeys)	Missing from zoo for 2 years Individual shot & killed Dec. 2005	NEWMLS 2007 http://www.nwemail.co.uk/news/viewarticle.aspx?id=400923
	South Lakeland, Cumbria	2005	10 sightings over the year	Includes Ulverston sighting below.	http://www.faunalia.com/pipermail/mvpsg/2005-November/000164.html - Farmers Weekly, 8/27/2004, Vol. 141 Issue 9, p72
1	Ulverston, Cumbria	Nov. 2005	Near Broughton Beck	Coati fought with a walker's dog	http://www.faunalia.com/pipermail/mvpsg/2005-November/000164.html - Farmers Weekly, 8/27/2004, Vol. 141 Issue 9, p72
1	Salisbury	6 May 2005 to June 2005	3 sightings of 1 individual London Rd.; Castle Rd.; Laverstock Park	No further details	www.news.bbc.co.uk/1/hi/england/wiltshire/4617045.stm
1	Melmerby, Cumbria	September 2004	At side of road, near Melmerby	No further details	www.newsandstar.co.uk/news/viewarticle.aspx?id=413423 - 'Call of Cumbria's wild' 19/09/2006
1	Langdale, Cumbria	April 2004	Seen by hikers at Bad Step at Crinkle Crag, in snow.	'Strange Animal Spotted on Crinkle Crag' Report 10/04/2004	http://www.cyclingforums.com/archive/index.php/t-110783.html
1	Haverthwaite, Cumbria	March 2004	A number of sightings over the year. One coati captured in a hen pen; had attacked a couple of hens & killed another.	Sent to South Lakes Wild Animal Park, Dalton, Barrow-in-Furness Westmoreland Gazette: 'Coati caught...but more are out there!'	www.beastwatch.co.uk/Cumbria.html#COATI1 - Westmoreland Gazette http://www.thewestmorlandgazette.co.uk/search/display.var.469787.0.coati_caught_but_more_are_out_there.php
1	Kirkby-in-Furness, Cumbria	March 2004	Individual captured/killed	RDS consider species ID inconclusive	RDS 2001-2006 summary

COATIMUNDI <i>Nasua nasua</i> (cont.)					
Inds.	Location	Date	Sightings	Details	Reference
1	Sizergh Castle, Kendal, Cumbria	February 2004	Member of public	No further details	www.beastwatch.co.uk/Cumbria.html#COATI www.newsandstar.co.uk/news/viewarticle.aspx?id=413423 'Call of Cumbria's wild' 19/09/2006
1	Sizergh Castle, South Lakeland, Cumbria	2004	Member of public	'fourth sighting of a coati in the last 12 months' - Cumbria Wildlife Trust	http://news.bbc.co.uk/1/hi/england/cumbria/3536063.stm - 'Raccoon-like animal found in UK' PA News: 'American animal spotted in UK' 5/3/04
1	Kentmere, Cumbria	February (?) 2004	No details	Possibly different individual to Haverthwaite capture.	www.beastwatch.co.uk/Cumbria.html#COATI1 - Westmoreland Gazette - Cumbria Wildlife Trust
1	Finsthwaite, Cumbria	January 2004	No details	Possible different individual to Haverthwaite capture.	www.beastwatch.co.uk/Cumbria.html#COATI1 - Westmoreland Gazette - Cumbria Wildlife Trust
1	Aira Force, Eden, Cumbria	Summer 2003	Member of public	Incident reported 05/04/2004	http://www.thewestmorlandgazette.co.uk/search/display.var.486176.0.coati_seen_at_force.php
10	No details	1979-2006	7 sightings involving 10 individuals	No details	Baker & Hills (2008)

Probably sightings of same individual
Probably sightings of same individual
Probably sightings of same individual

¹ Further sightings (no details) at Grizedale and Holker, (http://www.thewestmorlandgazette.co.uk/search/display.var.469787.0.coati_caught_but_more_are_out_there.php)

Table A5. Details of sightings of Siberian chipmunk in England.

SIBERIAN CHIPMUNK <i>Tamias sibiricus</i>					
Inds.	Location	Date	Sightings	Details	Reference
?	New Forest, Hampshire	4 October 2007	No Details	'a small colony of Chipmunks breeding in the New Forest'	www.blue-grey.blogspot.com/2007/10/sugar-glider.html
1	Near Reading, Berks.	Jan. 2006	Sighting	RDS confirmed; recapture in place.	RDS 2001-2006 summary
1	Near Reading, Berks.	Jan. 2006	Individual captured/photo'd	RDS confirmed; recapture in place.	RDS 2001-2006 summary
1	Warrington, Cheshire	August 2006	Sighting 5 released from Moore Nature Reserve	RDS confirmed; recent local release. 1 found dead	RDS 2001-2006 summary
1	Swindon, Wiltshire	August 2006	Individual captured/killed and photographed	RDS confirmed; recent local release. 19 released by vandals (7 August) 10 recaptured/9 killed by cats	RDS 2001-2006 summary
3	Riseley, Reading, Berkshire	November 2005	No details	30-70 escaped Wellington Country Park 18 found dead, 8 shot/trapped All accounted for.	The Times (23/11/05) - 'Revealed: the hunt for a gang of fugitives'. RDS 2007
1	Near Reading, Berkshire	May-Aug. 2005	Released from kids' zoo May 2005 Same event as above	RDS confirmed; recapture in place.	RDS 2001-2006 summary
3	Helmsley, N. Yorkshire	May 2004	Seen in garden.	RDS consider species ID inconclusive	RDS 2001-2006 summary
1	Peckfield landfill site, W Yorks	Summer 2000	Killed by North American red-tailed hawk during bird control operations	Offspring of pets released into woods by landfill worker "some years earlier"	CSL 2007
20	No details	1979-2006	14 sightings involving 49 individuals	No details	Baker & Hills (2008)

■ Probably sightings of same individual

Table A6. Details of sightings of black-tailed prairie dog in England.

BLACK-TAILED PRAIRIE DOG <i>Cynomys ludovicianus</i>					
Inds.	Location	Date	Sightings	Details	Reference
1	Glastonbury Tor, Somerset	September 2003	On drive of private property	Collected by RSPCA	Evening Standard – 'Found: one cute prairie dog, loves being cuddled-news in brief' (5/9/03)
colony	Cornwall	1976	6+ animals killed/caught	6km from a Wildlife park	Baker & Hills (2008)
colony	Isle of White	No details	Sighting outside Wildlife park perimeter	Burrows on agric. land; young born	Baker & Hills (2008)
colony	Cambridgeshire	No details	Sighting outside Wildlife park perimeter	No details	Baker & Hills (2008)
1	Staffordshire	No details	Sighted 'some distance from' Wildlife Pk.	No details	Baker & Hills (2008)
1	Norfolk	No details	Road casualty	Recovered 8km from a wildlife park	Baker & Hills (2008)
11	See above	1979-2006	10 sightings involving 15 individuals	See above	Baker & Hills (2008)

Table A7. Details of sightings of short-clawed otter in England.

SHORT-CLAWED OTTER <i>Aonyx cinerea</i>					
Inds.	Location	Date	Sightings	Details	Reference
?	Oxford	May 1996	'3 or 4 generations .. bred in wild..'	Newspaper article review.	Independent on Sunday (12/5/96) 'Asian otters thrive in chilly Oxford river'
1+	River Glyme, Oxford	1993	Sightings spanned 25km	Adult with cubs on one of these rivers	Baker & Hills (2008)
?	River Dorn, Oxford	1993	No details	No details	Baker & Hills (2008)
?	River Cherwell, Oxford	1993	No details	No details	Baker & Hills (2008)
?	Oxford canal/River Thames, Oxford	1991	No details	No details	Baker & Hills (2008)
?	Bath	1987	No details	No details	Baker & Hills (2008)
?	Bayswater Brook, Headington, Oxford	1986	Sightings spanned 17km	No further details	Baker & Hills (2008)
?	Gloucester	1985	No details	No details	Baker & Hills (2008)
1+	River Thame, Draycot, Oxford	1983	Adult with cubs	No further details	Baker & Hills (2008)
?	Kent	1981	No details	No details	Baker & Hills (2008)
?	Not stated (Oxford?)	1981	First reported feral	No further details	Baker & Hills (2008)
5	See above	1979-2006	5 sightings involving 6 individuals	See above	Baker & Hills (2008)

Table A8. Details of sightings of edible dormouse in England.

EDIBLE DORMOUSE <i>Glis glis</i>					
Inds.	Location	Date	Sightings	Details	Reference
?	Chilterns: Buckinghamshire, Berkshire and Hertfordshire	1997	Majority of estimated 10,000 population in Chilterns area; within 35km of introduction site at Tring Park	Introduced into Britain in 1902 as part of a wildlife collection, at Tring Park, Hertfordshire	Morris 1997
?	Bedfordshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Gloucestershire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Hampshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Northamptonshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Oxfordshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Shropshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Surrey	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Warwickshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Wiltshire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)
?	Worcestershire	No details	No details	Translocation from Chilterns or alternative introduction?	Harris et al. (1995)

Table A9. Details of sightings of red-necked wallaby in England.

RED-NECKED WALLABY <i>Macropus rufogriseus</i>					
Inds.	Location	Date	Sightings	Details	Reference
1	Near Wadebridge, Cornwall	September 2007	Wallaroo -sighting	Escaped North Cornwall Aviaries 18 months earlier (2006)	NEWMLS 2007
1	Near Wadebridge Cornwall	2007	Wallaroo - sighting	Escaped in 2007 from private farm	NEWMLS 2007
50 max	The Roaches, Peak District	Since 1939	There has been a group living at Roach End, part of the climbers' paradise of rocks known as the Roaches, for more than 50 years	Descended from escapees from a private zoo at Leek, Staffs., in 1930s	www.bbc.co.uk/dna/h2g2/A786477 www.uksafari.com/wallabies.htm www.introduced-species.co.uk/Species/mammals/red%20necked%20wallaby.htm www.beastwatch.co.uk/Staffordshire.htm#WALLABIES www.scottishbigcats.co.uk/crypto1.htm
?	Ashdown Forest, Sussex	No details	No details	'a few' present Colony present in 1940s	www.bbc.co.uk/dna/h2g2/A786477 www.uksafari.com/wallabies.htm www.introduced-species.co.uk/Species/mammals/red%20necked%20wallaby.htm
?	St. Leonard's Forest, Sussex	No details	No details	No details	www.wildaboutbritain.co.uk/forums/general-wildlife/2187-seeing-aliens.html
?	Buckinghamshire & Oxfordshire	'recent years'	'have a large population of wallabies, with nearly 30 sighted in recent years'	Beastwatch survey reported in newspaper	Yorkshire Post 18/09/06
1	Wickam Market, Suffolk	23 Sept. 2004	Cyclist saw wallaby bounding along road	No details	'Wallabies On The Loose In Suffolk' Evening Star: 23rd September 2004 www.scottishbigcats.co.uk/crypto1.htm
1	Bucklesham, Suffolk	23 Sept. 2004	Dead wallaby found in ditch	No details	'Wallabies On The Loose In Suffolk' Evening Star: 23rd September 2004 www.scottishbigcats.co.uk/crypto1.htm
?	Stokenchurch, Bucks	31 August 2004	Tiggywinkles Wildlife Hospital, Bucks. has already had six calls for wallabies that have come into trouble this year so far.	Bucks. increased reports of sightings; possibly escaped from local country parks and wildlife estates.	http://www.beastwatch.co.uk/Buckinghamshire.htm#WALLABY - BBC News
1	Warren Heath, Ipswich, Suffolk	?	Spotted sitting by roadside	No details	'Wallabies On The Loose In Suffolk' Evening Star: 23rd September 2004 www.scottishbigcats.co.uk/crypto1.htm
1	Mousells Wood, Frieth, Bucks	16 August 2004	Sighted by a motorist	Disappeared into the adjacent woods	www.beastwatch.co.uk/Buckinghamshire.htm#WALLABY - Bucks Free Press 30th April 2004
1	Duston Wildes, Northampton	2004	Garden, Duston Wildes & Garden, Kettering Road	Two sightings of same animal	www.beastwatch.co.uk/Northamptonshire.htm#WALLABY - Chronicle & Echo - 12 th & 14 th Aug 2004
1	Tuddenham, Suffolk	2004	Several sightings around Tuddenham	There has been a tip of from a resident that the Wallaby had been recaptured.	www.beastwatch.co.uk/Suffolk.htm#WALLABIES - Ipswich Evening Star - 20th October 2004
1	Chilham, Kent	23 April 2004	Hopping in grass by a roundabout near Erueka Leisure Park on 20th April 2004.	Disappeared from Badgers Hill Farm, Chilham, Canterbury in August 2000.	www.beastwatch.co.uk/Kent.htm#WALLABY - Kentish Express

RED-NECKED WALLABY <i>Macropus rufogriseus</i> (cont.)					
Inds.	Location	Date	Sightings	Details	Reference
1	Dereham, Norfolk	2003	Dead wallaby found in ditch	No further details	'Wallabies On The Loose In Suffolk' Evening Star: 23rd September 2004 www.scottishbigcats.co.uk/crypto1.htm
1	Bristol	14 March 2003	Escaped from Noah's Ark zoo, Bristol	No further details	www.beastwatch.co.uk/Bristol.htm#WALLABY - Ananova News
1	Shepreth, Cambs.	4 November 2002	No details	Escaped from Shepreth wildlife park Recaptured	www.beastwatch.co.uk/Cambridgeshire.htm#WALLABY - Cambridgeshire Evening News (10/01/2003)
1	Roman Bank, Scalford	25 July 2002	Seen by police patrol	Had escaped from The Butterfly and Wildlife Park in Long Sutton, Spalding.	- Spalding Today - 25th July 2002
2	Scalford	July 2002	Two wallabies escaped from a Gardening Centre in Scalford, during July 2002	One killed by a car on the A151 between Scalford and Holbeach; second free for months before recaptured.	www.beastwatch.co.uk/Lincolnshire.htm#WALLABY - Spalding Today
?	Oxfordshire	80s & 'recent years'	No details	Increased reports of sightings; possibly escaped from local parks and estates.	www.beastwatch.co.uk/Oxfordshire.htm#WALLABIES
?	Cromer	1850s	No details	Several wallabies escaped from a collection at Northrepps Hall, Cromer.	www.beastwatch.co.uk/Norfolk.htm#WALLABIES
1	Llanishen, Cardiff	15 October 2004	4 sightings in Cardiff - one photo'd	No details	www.beastwatch.co.uk/Cardiff.htm#WALLABY%20http://news.bbc.co.uk/1/hi/wales/south_east/3748344.stm
1	Islay, Scotland	9 June 2004	Dead wallaby found on Scottish island	Buried after being examined by Police and Environmental Health officials	www.beastwatch.co.uk/Argyll.htm#WALLABY - The Scotsman
c40	Inchconnachan, Loch Lomond	2002	A colony c40 wallabies in 2002 (SNH 2002)	Introduced on the island in the 1960s or 1970s by Lady Arran.	www.bbc.co.uk/dna/h2g2/A786477 www.visit-lochlomond.com/islands.html SNH (2002)
?	Isle of Man	18 May 2007	Concern about the number of wallabies on the TT course	'more than seven sightings in the last two months'.	Wallabies on TT course www.iomtoday.co.im/north-news/Wallabies-on-the-TT-course.2888769.jp
1	Isle of Man	9 March 2004	A wallaby bouncing along the road near Quarry Bends near the Wildlife Park	Captured and later released back into the wild, after a check-up	www.iomtoday.co.im/news/WILD-WALLABY-CAUSES-A-STIR.753211.jp 09/03/2004
c30	Isle of Man	3 November 20/01	Captured in Ballaugh Curraghs; returned after vet check-up	Now around 30 wallabies at Ballaugh Curraghs after some escaped from the Wildlife Park some years ago.	Wild wallaby drops by www.iomtoday.co.im/news/WILD-WALLABY-DROPS-BY.435943.jp

Reports of wallabies at: Loch Lomond, Argyle & Bute, Buckinghamshire, Derbyshire, Durham, East Sussex, Oxfordshire, Kent, Newcastle on Tyne, North Yorkshire, West Sussex, Ballaugh, Isle of Man (www.beastwatchuk.proboards41.com/index.cgi?action=display&board=PROJECTS&thread=1107712430&page=1)

Table A10. Details of sightings of sugar glider in England.

SUGAR GLIDER <i>Petaurus breviceps</i>					
Inds.	Location	Date	Sightings	Details	Reference
1	Wimbledon Common, London	3 October 2007	No details	'Sugar gliders were first noticed in 2000 and it appears they are breeding as there have been several sightings in different parts of the common'.	Article: Is mystery squirrel playing possum after un-Common sighting? www.wimbledonguardian.co.uk/news/topstories/display.var.1733676.0.is_mystery_squirrel_playing_possum_after_uncommon_sighting.php
4	Wimbledon Common, London	2003-2007	No details	www.introduced-species.co.uk , has had 4 reports of sugar-gliders on Wimbledon Common dating back to 2003, though no conclusive proof as yet'.	Article: New exotic pests colonising South West London www.wildlifeextra.com/exotic-pests378.html :
1	Brompton cemetery		No details	No details	www.wildlifeextra.com/exotic-pests378.html :

 Probably sightings of same individual

Table A11. Details of sightings of monk parakeet in England.

MONK PARAKEET <i>Myiopsitta monachus</i>					
Inds.	Location	Date	Sighting	Details	Reference
5	Mudchute Farm, Isle of Dogs	25/06/07	At least 5 by horse field	No further details	www.birdguides.com
<45	Borehamwood, Herts	2007	No details	'last two or three years the numbers have dwindled'	www.cjwildlifeforum.com/archive/index.php/t-165.html
<45	Borehamwood, Herts	2007	No details	'decline in recent years'	www.cjwildlifeforum.com/archive/index.php/t-165.html
≥45	Borehamwood, Herts	2003	Whitehouse Ave., Furzehill & Cardinal Rds., Aberford Park.	No details	www.hertsbirdclub.org.uk/monkparakeets.html
?	Devon & Hertfordshire	2004	'..has been found in both Devon and Hertfordshire..'	No details	Sunday Times Sept. 2004 (JS search) – 'Call to wipe out invading parrots'
?	No details	2002	'scattered records'	No details	Ogilvie <i>et al.</i> 2004
≥35	Borehamwood, Herts.	2002	Breeding – no nest count	Population established.	Ogilvie <i>et al.</i> 2004
≥8	Castle Combe, Wilts.	2002	Present for ≥ 2 years.	No information on breeding.	Ogilvie <i>et al.</i> 2004
?	No details	2001	'occasional sightings'	No details	Ogilvie <i>et al.</i> 2004
≥32	Borehamwood, Herts.	2001	7 nests, success unknown.	Population established.	Butler 2002, Ogilvie <i>et al.</i> 2003, Butler 2005
1 pair	Lonsdale reservoir, Surrey	1996-2001	Bred in 1999	1 bird died 2001 2 nd bird disappeared Probably bred	Butler 2002, Ogilvie 2003, www.hertsbirdclub.org.uk/monkparakeets.html Holling <i>et al.</i> 2007
1 pair	Greater London	2003			
≥32	Borehamwood, Herts.	≤1993	Have bred since at least 1996	Population established	Butler 2002 Butler <i>et al.</i> 2002, Butler 2005
≤30	Tiverton, Devon	1987-1998	No details	Birds probably died out	Butler <i>et al.</i> 2002, www.hertsbirdclub.org.uk/monkparakeets.html
9	Barnton, Cheshire	1988-1993	No details	Birds probably died out	Butler 2002, www.hertsbirdclub.org.uk/monkparakeets.html
?	Stoke-on-Trent	1982-1984	No details	Birds probably died out	National Biodiversity Network - Stoke-on-Trent Environmental Survey results (1982-1984)

 Same colony

Table A12. Details of sightings of Alexandrine parakeet in England.

ALEXANDRINE PARAKEET <i>Psittacula eupatria</i>					
Inds.	Location	Date	Sighting	Details	Reference
?	Merseyside	No details	'established an enclave in Merseyside'	No further details	Sunday Times 2004
6	Lewisham Crematorium	2002	Pure and hybrids at ring-necked roost	3 x <i>P. eupatria</i> 3 x <i>P. eupatria</i> x <i>P. krameri</i>	Butler 2005, Butler 2002
?	Fazakerly Merseyside	No details	'..nesting in tree holes..'	No further details	Express on Sunday (25/11/01) – 'Strange birds of a feather are flocking together. How rare visitors from thousands of miles away are making the most of our warmer climate and settling here'
1 pair	Foots Cray Meadows, Kent	2001	Breeding	Fledged ≥1 young	Butler et al. 2002
2 pair	Sidcup, Kent	2002	2 hybrid nests	<i>P. eupatria</i> x <i>P. krameri</i>	Butler 2002, Butler 2005
1 pair	Sidcup, Kent	2001	1 hybrid nest	<i>P. eupatria</i> x <i>P. krameri</i>	Butler 2002, Butler 2005, Ogilvie et al. 2003
1 pair	Fazackerley, Merseyside	1999	1 pair bred	Survived 1998 shootings	Butler 2002, Butler 2005
12	Fazackerley, Merseyside	1998	2 pairs bred – 8 young	Many of the 12 birds shot	Butler 2002, Butler 2005
2+	Fazackerley, Merseyside	1997-1999	Breeding	Bred successfully	Butler et al. 2002., Ogilvie et al. 2003

Probably sightings of same colony
Probably sightings of same colony

Table A13. Details of sightings of blue-crowned parakeet in England.

BLUE-CROWNED PARAKEET <i>Aratinga acuticaudata</i>					
Inds.	Location	Date	Sighting	Details	Reference
7	Lymington, Hampshire	2002	No details	No details	Ogilvie 2004
5	Bromley	2001	Visiting bird feeder	No further details	Butler 2002
2 pair	Park, Lewisham, Kent	2001	2 nd pair in same park as 1 st breeding pair.	The 2 pairs occasionally associated	Butler et al. 2002
1+	Bromley	2001	Park 1.5km from Lewisham nest	No further details	Butler et al. 2002
1+	Garden, Lewisham	2001	Gardens 750m from Lewisham nest	No further details	Butler et al. 2002
1 pair	Park, Lewisham, Kent	2001	1 st observation of nest. Nest <25m from ring-necked nests.	Nest predated – grey squirrel? No breeding attempt 2002.	Butler 2002, Butler et al. 2002, Butler 2005
15	Beckenham	1999	Flock of 15	No further details	Butler 2002, Butler et al. 2002
8	Bromley	1999	Visiting bird feeder. Flock included juveniles.	Part of larger flock of 15 nearby in Beckenham (above)	Butler 2002, Butler et al. 2002, Butler 2005 Ogilvie et al. 2003
1 pair	Bromley	1997	Visiting bird feeder	No further details	Butler 2002, Butler et al. 2002, Ogilvie et al. 2003

Probably sightings of same colony
Probably sightings of same colony

Table A14. Details of sightings of eagle owl in England.

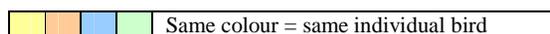
EAGLE OWL <i>Bubo bubo</i>					
Inds.	Location	Date	Sighting	Details	Reference
1	Coltishall, Norfolk	2 Nov. 2007	Flushed by rooks	Heard calling at TG259205	www.birdguides.com
1	Heswall, Cheshire	31 Oct. 2007	Heard and seen in Pensby	No further details	www.birdguides.com
1	Leicester, Leics.	11 Jun. 2007	Sighted in Glenfield	Escaped bird (present c1 week)	www.birdguides.com
3 pair	Lancashire	June 2007	No details	'...3 pairs nesting in Lancashire..' '...3 pairs in this area..'	www.birdguides.com/webzine/article.asp?a=1026 'Eagle Owls in the Forest of Bowland' www.owls.org/News/feathersfly.htm 'Feathers Fly Over UK Eagle Owls Once Again!'
1	Merseyside	April 2007	Sitting on garden fence	Fate unknown	Lancs. Evening Post June 2007 'Twitchers told to stay away'
1♂	Bramhope	April 2007	Present 'for a few weeks'	Capture planned?	www.wharfedaleobserver.co.uk/mostpopular.var.1353079.mostviewed.appearance.of.eagle.owl.at.bramhope.has.birdwatchers.twitching.php
1	Middlesborough, Cleveland	20 Apr. '07 4 Mar. '07	Roosting in Captain Cook square In Albert Road	Presumed escaped bird Present in town centre since Sept. 2006	www.birdguides.com
1	Thornaby, Teeside	Feb. 2007	No details	Escaped – damaged aviary	BBC Radio Cleveland
1	Heaton, Bolton	Feb. 2007	Present '..for about 7 weeks..'	Died – secondary poisoning?	www.theboltonnews.co.uk/mostpopular.var.1184267.mostviewed.rare.owl.spotted.in.bolton.php
1	Scrooby, Notts.	15 Feb. '07 14 Feb. '07	Mill Lane Near Bawtry Garden Centre	No further details	www.birdguides.com
1 pair	Bowland Fells, Lancashire	2007	OS ref: SD 659542 or SD 660543	Successfully bred - 3 young	www.owls.org/News/feathersfly.htm 'Feathers Fly Over UK Eagle Owls Once Again!' The Times June 2007 – 'Nature Notes: The Register' Lancs. Evening Post June 2007 - 'Twitchers told to stay away'
1 pair	Bowland Fells, Lancashire	2006	Breeding attempt	Unsuccessful	www.owls.org/News/feathersfly.htm
1	Lickey Hills CP, Worcs.	14 May '06	No details	Trapped and later released elsewhere	www.birdguides.com
1 ♀	MOD Catterick, N. Yorks.	Jan. 2006	Female shot In total pair fledged 23 young.	21 young unaccounted for: 1 hit power lines in Shropshire; 1 found dead in Peebles; 1 shot near Masham;	www.owls.org/News/feathersfly.htm
1	Alfriston, East Sussex	9 Dec. '05	Car park of The Star pub	No further details	www.birdguides.com
1	Twyford, Derbys.	29 Nov. '05	Near the stables	No further details	www.birdguides.com
1	Hitchin, Herts.	8 May '05	Mulberry Way, Westmill	No further details	www.birdguides.com
1	Lichfield, Staffs.	4 Apr. '05	In a private garden	Presumed escape	www.birdguides.com
1	Penzance, Cornwall	2 Oct. '04	By A30 between Penzance and Drift	No further details	www.birdguides.com
1	Burton-upon-Trent	Sept. '04	No details	Escaped? Fate unknown.	www.beastwatch.co.uk/Staffordshire.htm#EAGLEOWL - Burton Mail
1 pair	Highfields, Huddersfield	Feb. '04	Roof of building, near allotments.	Escaped? Fate unknown.	www.beastwatch.co.uk/Kirklees.htm - Huddersfield Daily Examiner
1	Astley Green, Manchester	16 Feb. '04	Near Worsley Moss	Seen hunting over Landfill site	www.birdguides.com

EAGLE OWL <i>Bubo bubo</i> (cont.)					
Inds.	Location	Date	Sighting	Details	Reference
1	Wigan, Manchester	6 Feb. '04	Pier car park	No further details	www.birdguides.com
1	Elmley Marshes RSPB, Kent	1 Feb. '04	Roosting south of RSPB car park	Previously seen 30 January	www.birdguides.com
1	Eaton, Norwich, Norfolk	1 Feb. '04	In flight over golf course	'Bella' an escaped Bengal eagle owl	www.birdguides.com
1	Norwich	Jan. '04	Escaped – private owner.	Fate unknown	www.beastwatch.co.uk/Norfolk.htm#EAGLEOWL - Eastern Daily Express
1	Scunthorpe	Jan. '04	Escaped – private owner.	Recaptured	www.beastwatch.co.uk/Lincolnshire.htm#EAGLEOWL
1	Harrogate, N. Yorks.	24 Aug. '03	Harrogate/Knaresborough	Sightings over some weeks	www.birdguides.com
1	Iford, Essex	April '03	Escaped – private owner.	Predated (fox?)	www.beastwatch.co.uk/Essex.htm#EAGLEOWL - BBC News Daily Record – 'Catch me if you can Here's to the animal crackers that got away' (23/4/03) Independent - 'Beware, if it has a 6ft wingspan and piercing orange eyes, leave the bird alone' (15/4/03)
1	Scunthorpe, Lincs.	14 Dec. '02 20 Jan. '03	6 sightings: Heavy Section Mill, Lime Grove, Hereward Place, Bellingham Road.	Frequently calling; harassing pigeons	www.birdguides.com
1	Ilkley Moor	2002	Escaped – private owner.	Recaptured Free for 2 years	www.wharfedaleobserver.co.uk/mostpopular.var.1353079.mostviewed.appearance.of.eagle.owl.at.bramhope.has.birdwatchers.twitching.php Yorkshire Post (11/3/04) – 'Moors eagle owl caged after two years on wing'
1 pair	MOD, Catterick N. Yorks.	2002	Successful breeding attempt – 2 young	15 young raised to date.	Ogilvie <i>et al.</i> 2004
1	Norfolk	2002	No details	No details	Ogilvie <i>et al.</i> 2004
1	Warwickshire	2002	'long staying individual'	Not seen after February.	Ogilvie <i>et al.</i> 2004
1	Doncaster, S. Yorks.	16 Oct. '02	No details	Escaped in High Melton area	www.birdguides.com
1	Cuddesdon, Oxfordshire	9 Aug. '02	On church wall. Also seen 3 weeks before	Presumed escape	www.birdguides.com
1	Sheffield, S. Yorks.	21 Feb. '02	Claywood Drive	Escaped bird	www.birdguides.com
1 pair	MOD, Catterick, N. Yorks.	2001	Pair have bred since 1996	13 young to date; only 1 failed attempt.	Ogilvie <i>et al.</i> 2004
1	Birdwell, S. Yorks.	13 Sept. '01	In village, around Firbeck Hall	Escaped bird - jesses	www.birdguides.com
1	Bebington, Cheshire	26 July '01	Oakley Grove Roosting in a garden	Escaped bird	www.birdguides.com
1	Lincoln, Lincs.	24 Mar. '01	St Andrew's Street	No further details	www.birdguides.com
1	Hull, East Yorks.	13 Feb. '01	Shaftesbury Avenue	RSPCA to attempt capture	www.birdguides.com
1	Stourbridge, W. Midlands	Sept. '00	No details	terrorised by a solo bird which has killed several cats	Daily Mail (18/9/00) - 'Lock up pets from airborne assassin'
1	Shibden Park, Halifax	2000	Attacked Jack Russell dog	No further details	Mirror (9/2/2000) – 'Eagle owl takes dog' Evening Standard (8/3/00) - 'UK car dealers warned Park attack owl flies off with dog in talons'
1	West Yorkshire	1999	Attacked collie & duck on farm	No further details	Mirror (9/2/2000) – 'Eagle owl takes dog'

	Probably sightings of same pair
	Probably sightings of same pair
	Possible sightings of same bird

Table A15. Details of sightings of sacred ibis in England.

SACRED IBIS <i>Threskiornis aethiopicus</i>					
Inds.	Location	Date	Sighting	Details	Reference
1	Stiffkey, Norfolk	04/09/07 to 08/10/07	On floods south of A149 and on Stiffkey Fen; nine separate sightings/1 individual	Red colour-ringed bird Most likely an escapee.	www.birdguides.com
1	Holkham Freshmarsh, Norfolk	28/08/07 to 07/10/07	'near west end of pines'; 13 separate sightings of 1 individual	Same bird as at Stiffkey (above)	www.birdguides.com
1	Well-next-the-Sea, Norfolk	29/09/07	Flew west over field west of Beach Road	Same bird as at Stiffkey (above)	www.birdguides.com
1	Vale Pond, Guernsey	15/08/07	Le Petit Axce Lane	Photographed	www.birdguides.com
1	Holme NWT, Norfolk	14/08/07	In flight	Unknown origin	www.birdguides.com
1	Wraysbury GPs, Windsor	20/01/06	In flight	'probable' sacred ibis	www.birdguides.com
1	Rue Mainguy, Guernsey	28/01/05	Feeding alongside five grey heron	No further details	www.birdguides.com
1	Rue des Bergers NR, Guernsey	31/12/04	No details	No further details	www.birdguides.com
1	East Dereham, Norfolk	26/09/04 05/10/04	In field c. 1km NE of Dereham; 4 separate sightings	No further details	www.birdguides.com
1	Wheldrake Ings, N. Yorks.	20/08/02	100m NW of Swantail hide Reported earlier in Thorganby area (3km to south)	Unknown origin.	www.birdguides.com
1	Broomhill Flash (Dearne Valley), S. Yorks.	04/08/02	Single bird	No further details	www.birdguides.com
1	Brampton Bierlow, S. Yorks.	04/08/02	Flew south	Same bird as above – 3km between sites	www.birdguides.com
1	Stone, Staffs	18/06/02	By Trent & Mersey canal	Adult bird; no rings; no tags	www.birdguides.com
1	Redes Mere, Cheshire	05/06/02	SJ8472	No further details	www.birdguides.com
1	Scopwick, Lincs	15/03/02	Half mile from Scopwick	Escapee - later recaptured (23/03/07)	www.birdguides.com
1	Ramsgate, Kent	05/01/02	In Ramsgate cemetery; 3 separate sightings	London zoo escapee on 01/01/02?	www.birdguides.com
1	Caister-on-Sea, Norfolk	05/11/01	Runham Swim, 1.5 miles SE of Runham	No further details	www.birdguides.com
1	Horsey, Norfolk	11/10/01 04/11/01	In flight; 3 separate sightings	No further details	www.birdguides.com
1	Martham Broad, Norfolk	01/11/01	In flight	No further details	www.birdguides.com
1	Cromer, Norfolk	30/09/01	Standing in pool on Cromer/Overstarnd beach	Tried to fly out to sea several times but was bothered by gulls	www.birdguides.com
1	Aldeby landfill site, Beccles, Norfolk	02/07/01	No details	Unknown origin	www.birdguides.com
1	Buckenham Marshes (RSPB) Norfolk	26/05/01	On pool by hide; 3 separate sightings/1 individual	No further details	www.birdguides.com
1	Strumpshaw Fen, Norfolk	13/05/01	Circled high	Same bird as above	www.birdguides.com

 Same colour = same individual bird

Annex II

Distribution maps of non-native species

- distribution of species sightings in England by county

(Figures A1-A15)

Key:

- ⊙ Pre 2000 sighting
- Post 2000 sighting
- * Current nesting site (i.e. between 2005-2007)

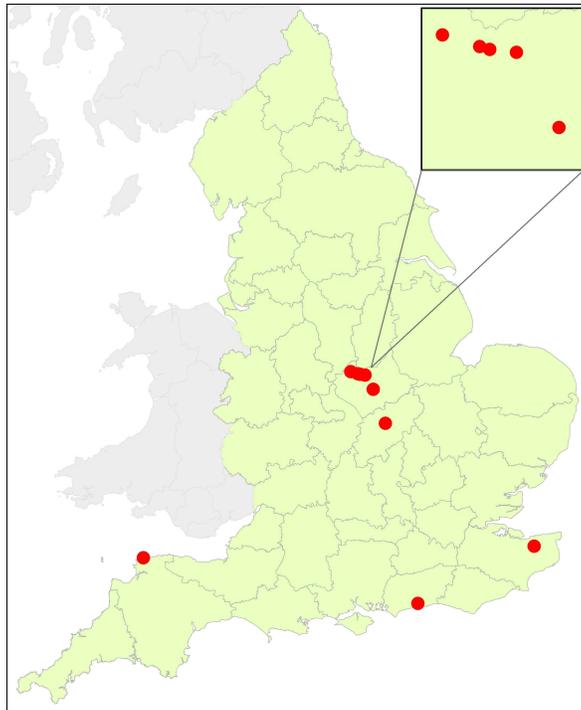


Figure A1. Distribution of RACCOON sightings in England.

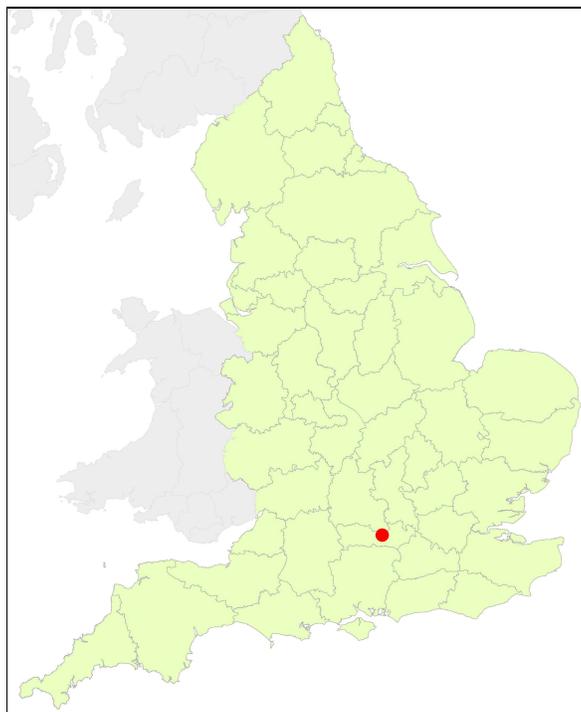


Figure A2. Distribution of RACCOON DOG sightings in England.

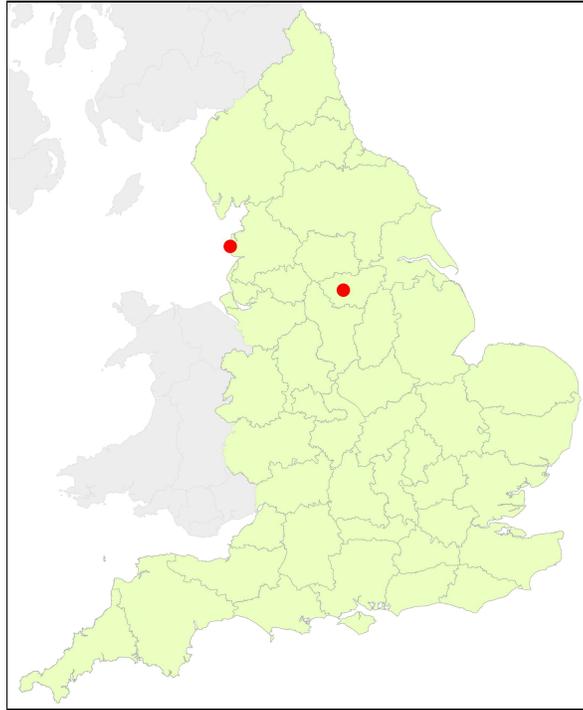


Figure A3. Distribution of SKUNK sightings in England.

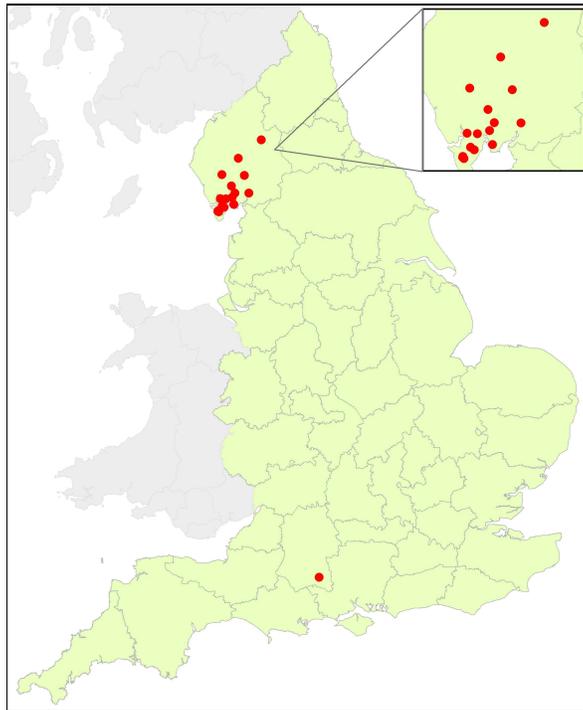


Figure A4. Distribution of COATIMUNDI sightings in England.

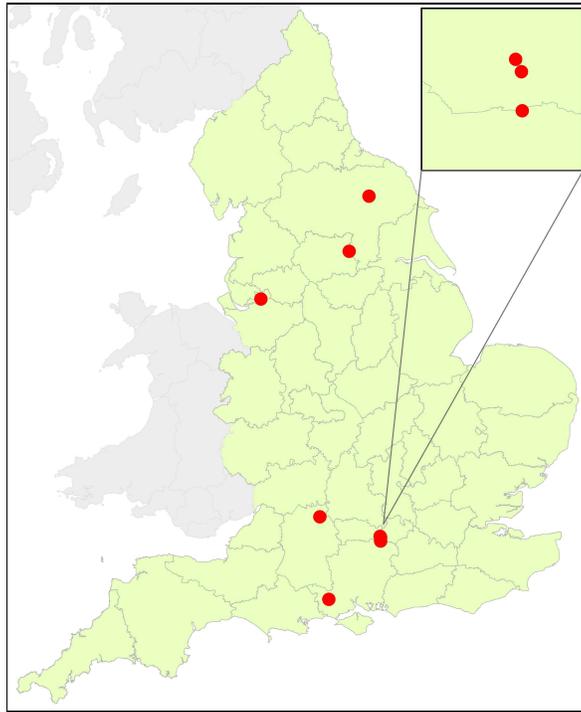


Figure A5. Distribution of **SIBERIAN CHIPMUNK sightings in England.**

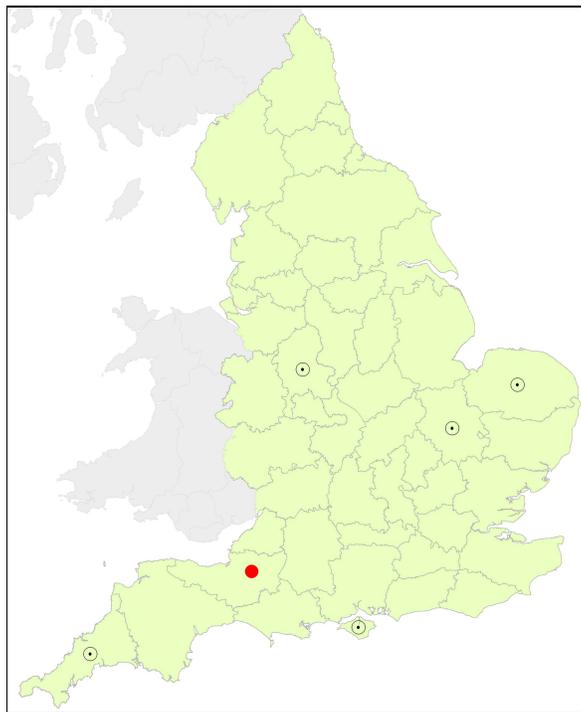


Figure A6. Distribution of **BLACK-TAILED PRAIRIE DOG sightings in England.**



Figure A7. Distribution of **SHORT-CLAWED OTTER** sightings in England.

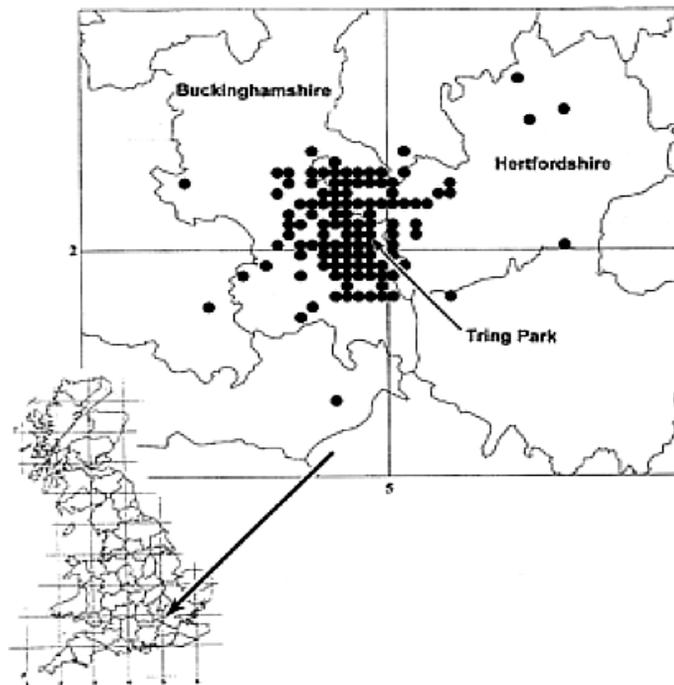


Figure A8. Distribution (1km squares) of the main population of **EDIBLE DORMOUSE** in England. Figure from Morris (1997).

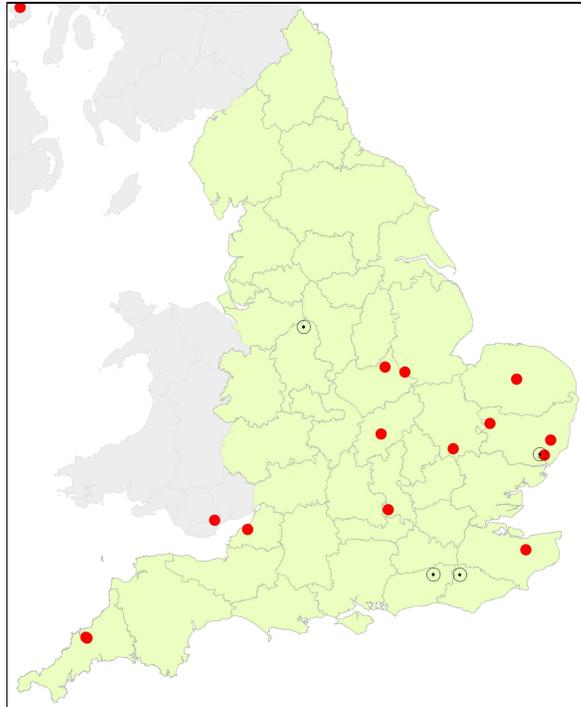


Figure A9. Distribution of RED-NECKED WALLABY sightings in England.

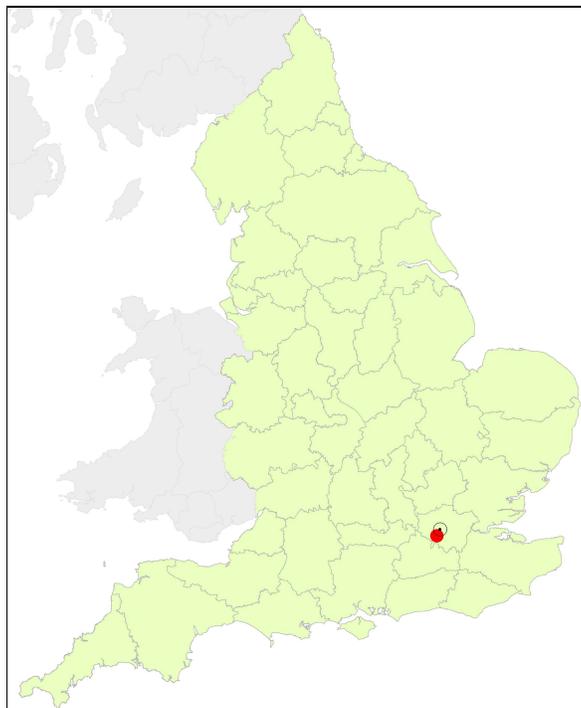


Figure A10. Distribution of SUGAR GLIDER sightings in England.

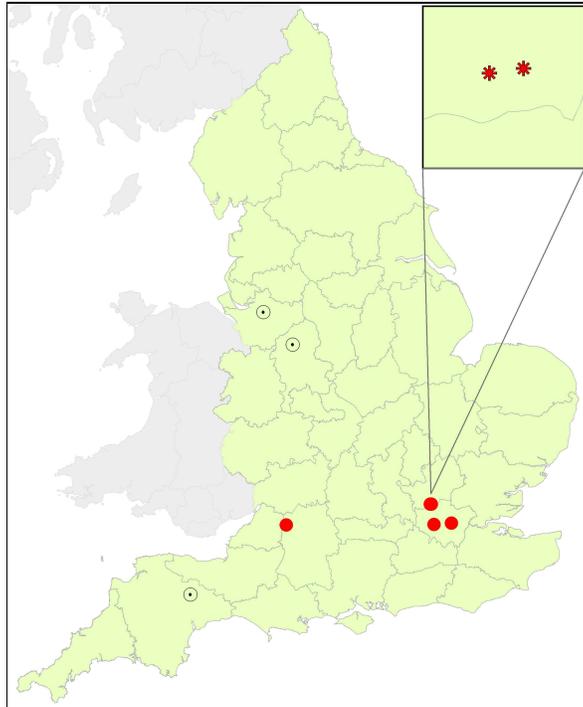


Figure A11. Distribution of MONK PARAKEET sightings in England.

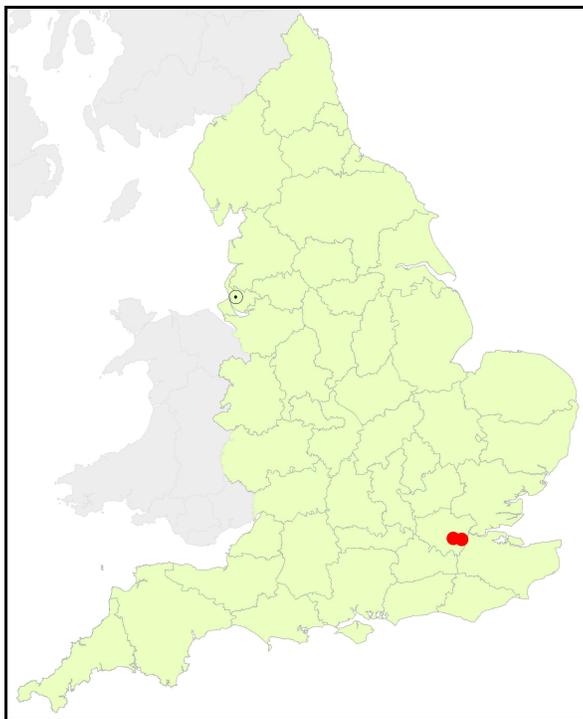


Figure A12. Distribution of ALEXANDRINE PARAKEET sightings in England.

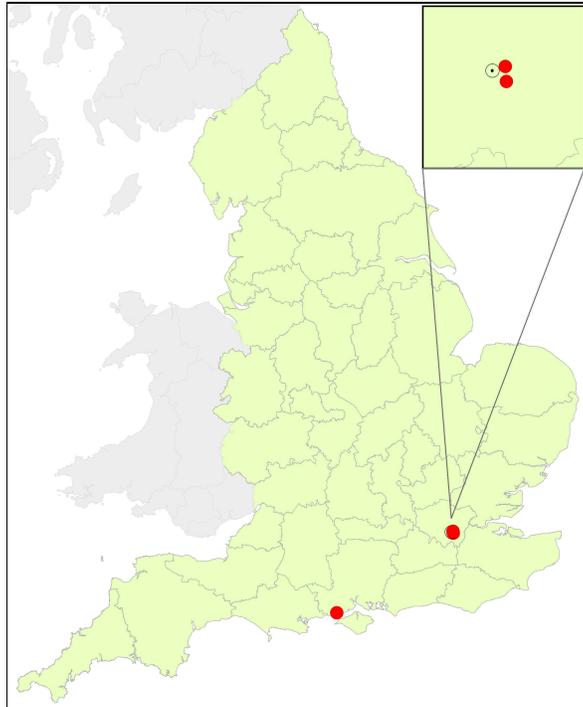


Figure A13. Distribution of BLUE-CROWNED PARAKEET sightings in England.

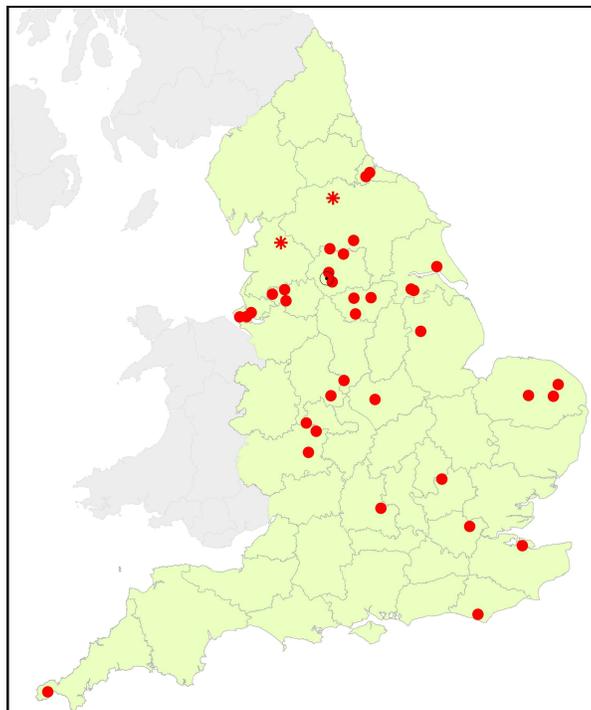


Figure A14. Distribution of EAGLE OWL sightings in England.

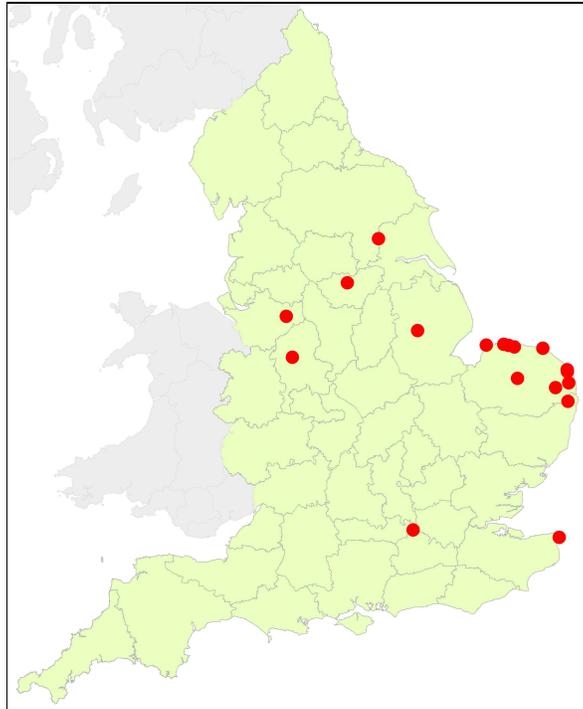


Figure A15. Distribution of SACRED IBIS sightings in England.